"A COMPARATIVE STUDY BETWEEN MARSHALL AND ROTTERDAM CT SCORES IN PREDICTING EARLY OUTCOME IN PATIENTS OF TRAUMATIC BRAIN INJURY"

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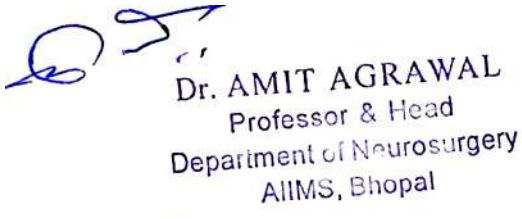

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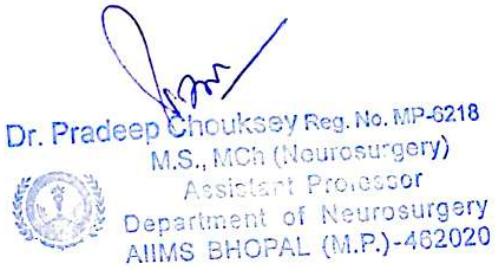

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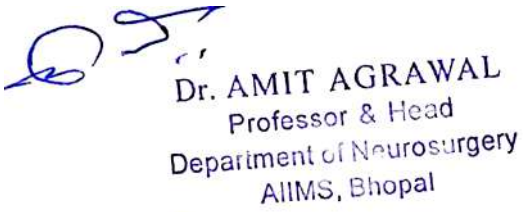

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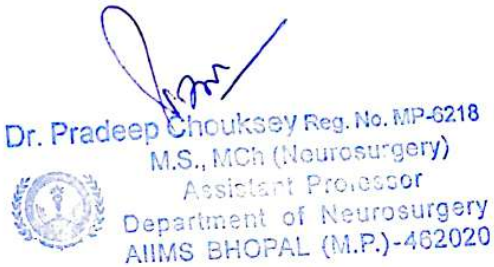

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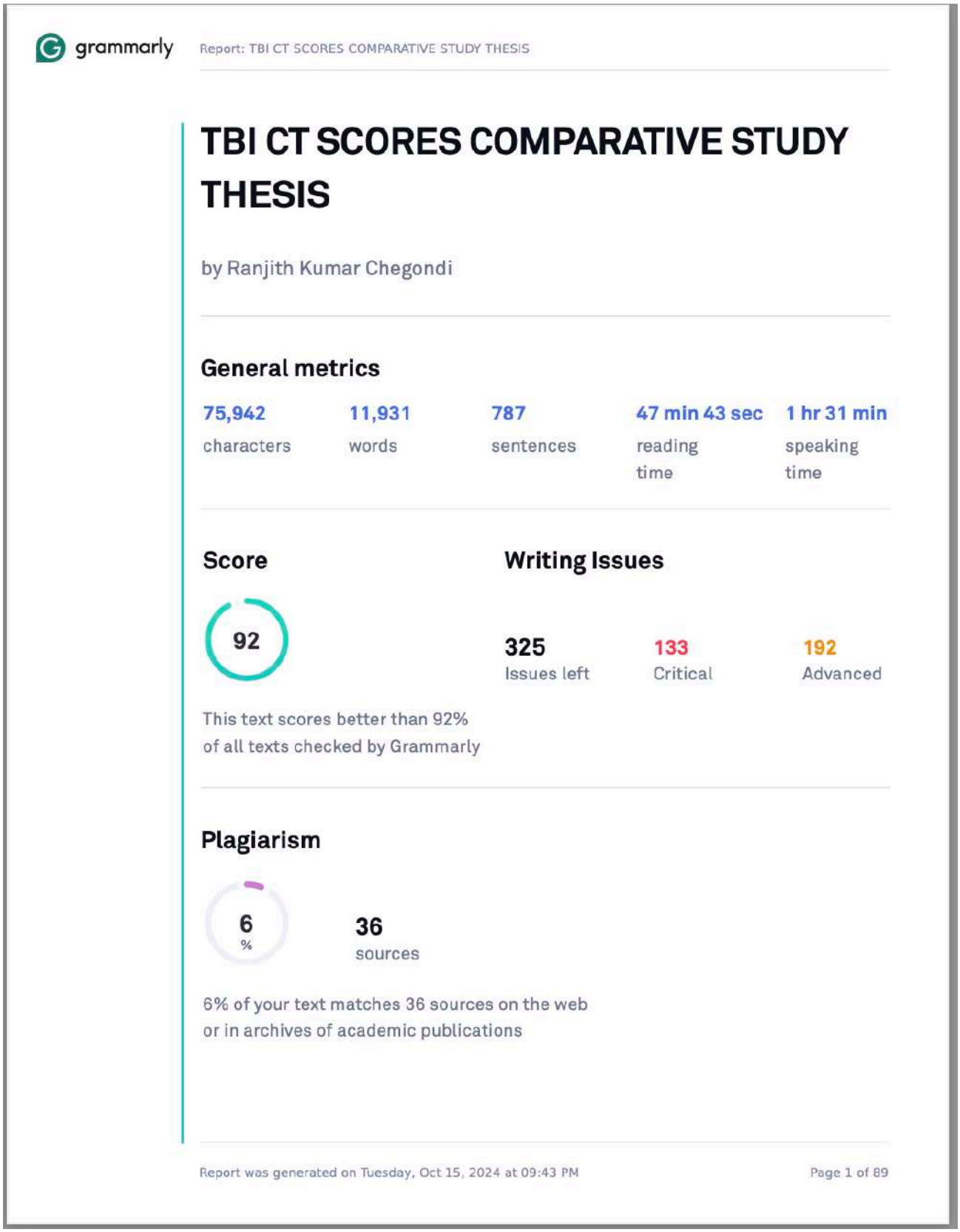

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TBI CT SCORES COMPARATIVE STUDY THESIS

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ABBREVIATIONS

AUC	Area under the receiver operating characteristic curve
CT	Computerized tomography
GCS	Glasgow Coma Scale
ICP	Intracranial pressure
ICU	Intensive care unit
IVH	Intraventricular hemorrhage
LMICs	Low- to middle-income countries
ROC	Receiver operating characteristic
TBI	Traumatic brain injury
SDH	Subdural hemorrhage
EDH	Extradural haemorrhage
SAH	Subarachnoid haemorrhage
DC	Decompressive craniectomy

SL.NO	TABLE OF CONTENTS	PAGE NUMBER
1	INTRODUCTION	1-6
2	REVIEW OF LITERATURE	7–16
3	AIIMS AND OBJECTIVES	17-18
4	MATERIALS AND METHODS	19-25
5	OBSERVATIONS AND RESULTS	26-45
6	DISCUSSION	46-53
7	CONCLUSIONS AND SUMMARY	54-55
8	STUDY LIMITATIONS	56
9	LIST OF ANALYTICAL TABLES	57
10	LIST OF ROC, AUC CURVES, PIE CHARTS SCATTER PLOTS	58
11	REFERENCES	59-62
	ANNEXURES	
I	PARTICIPANT INFORMATION SHEET	63-71
II	PARTICIPANT CONSENT FORM	72-75
III	PROFORMA	76-80
IV	MASTER CHART	81-83

INTRODUCTION

INTRODUCTION

Traumatic brain injury (TBI) is an issue worldwide and is a significant factor in trauma-related deaths[1]. Prognostic accuracy continues to be a complex task. Henceforth, it is wise to establish a system that can accurately diagnose and predict the outcomes of TBI cases. TBI patients are commonly categorized as having mild, moderate and severe head injuries based on their Glasgow Coma Scale (GCS) scores; In cases where severe head trauma patients require intubation for airway protection or are paralyzed for reasons to control intracranial pressure or sedated for a head CT scan evaluation. Accurately assessing the Glasgow Coma Scale (GCS) may pose challenges. A practical and efficient approach in situations is to rely promptly on a model system that incorporates morphological criteria derived from radiographic images[2]. While magnetic resonance imaging remains a choice for assessment purposes, its utility is constrained by the time needed for acquisition and the limitations of applying it to ventilated critically ill patients[2]. Henceforth, it is challenging to detect changes in matter during the later stages of the disease's progression. Thus far, in our current array of radio imaging tools and techniques available for assessment of post-traumatic brain injury (TBI), CT scans still reign as the preferred choice for evaluating immediate structural damage post-injury. Thanks to CT scans, they have made advancements in enhancing patient outcomes following TBI. The predictive significance of specific variables observed in CT scans, such as basal cistern status, midline shift, Traumatic subarachnoid haemorrhage and intracranial lesions, has been confirmed in previous research studies. Marshall and Rotterdam are the commonly utilized scoring systems that organize CT findings in distinct groupings. The Marshall Classification of TBI is a CT scan-derived index that uses few features and has been shown to be predictive of outcomes in TBI patients[2]. The Rotterdam Score is a new system that attempts to address some of the recognized limitations of the Marshall system, such as the problem of classifying patients with multiple types of injury [3]. Both systems have value in predicting outcomes, but the recent Rotterdam score appears to include an additional variable[4].

MARSHALL CLASSIFICATION OF TBI

The Marshall system places patients into one of six categories (I to VI) of increasing severity on the basis of findings on a non-contrast CT scan of the brain. Higher categories have worse prognosis and survival[17]. It is primarily concerned with two features: degree of swelling, as determined by midline shift and/or compression of basal cisterns, and presence and size of contusions/ haemorrhages referred to as "high or mixed density lesions". Classification includes[35]-

diffuse injury I (no visible pathology)	no visible intracranial pathology
diffuse injury II	midline shift of 0 to 5 mm, basal cisterns remain visible ,no high or mixed density lesions >25 cm3
diffuse injury III (swelling)	midline shift of 0 to 5 mm basal cisterns compressed or completely effaced no high or mixed density lesions >25 cm3
diffuse injury IV (shift)	midline shift >5 mm, no high or mixed density lesions >25 cm3
evacuated mass lesion V	any lesion evacuated surgically
non-evacuated mass lesion VI	high or mixed density lesions >25 cm3 not surgically evacuated

Early poor prognosis rate according the grade[17]-

Marshall CT class	***Early poor prognosis rate(%)***
I	16.7
II	25.0
III	39.5
IV	48.1
V	71.4
VI	76.0
≥IV	65.0
<IV	29.5

ROTTERDAM CT SCORE OF TBI

The Rotterdam CT score of traumatic brain injury is a relatively recently described classification aimed at improving prognostic evaluation of patients admitted with moderate or severe traumatic brain injuries[5]. The Rotterdam classification[5] includes four independently scored elements. Like the Marshall system, it includes 1) degree of basal cistern compression and 2) degree of midline shift. It does not, however, include contusions, but rather restricts mass lesions to 3) epidural haematomas, and adds 4) intraventricular and/or subarachnoid blood.

Each of these is given a score, and these scores are tallied, with the addition of 1 to the total. In other words, a completely normal appearing scan has a Rotterdam score of 1 and the worst possible score is 6. To the sum of the score a plus 1 must be added, which makes it comparable to the Marshall system.

Classification

	0	1	2
BASAL CISTERNS	NORMAL	COMPRESSED	ABSENT
MIDLINE SHIFT	NO SHIFT OR <=5MM	SHIFT >5MM	
EPIDURAL MASS LESION	PRESENT	ABSENT	
INTRAVENTRICULAR BLOOD OR TRAUMATIC SAH	ABSENT	PRESENT	

Prognosis

In adults the mortality at six months[8] increases with the score 1:

- score 1: 0%
- score 2: 7%
- score 3: 16%
- score 4: 26%
- score 5: 53%
- score 6: 61%

Children have lower mortality in lower Rotterdam scores (scores 2 and 3), and higher mortality at higher scores (scores 4 to 6).

TBI's Clinical outcomes are multifactorial and vary across institutions, regions, age groups, and healthcare systems. Due to the malignant nature of TBI, various prediction and prognostic models are used for resource allocation, prediction of clinical outcomes at the time of admission, decision-making, and family counselling[7]. Results of the IMPACT study group showed that computed tomography (CT) characteristics have the highest prognostic value after clinical severity. Marshall (1995) and Rotterdam CT (2005) scoring systems are the two most commonly used to predict clinical outcomes in TBI patients[7]. Recently, many studies were conducted to evaluate the comparative efficacy of the two prediction models. Each of these models aims to improve the outcome prediction and has its limitations. Since surgery guidelines for TBI patients are not uniform worldwide, two significant limitations of Marshall's scoring are the division of hematoma based on volume and surgical evacuation. Additionally, existing literature favours either scoring system, and there is no conclusive evidence as to which scoring systems have better predictive power[7].

Therefore, this comparative study aimed to compare both studies and update the available evidence from existing studies of the predictive value of the Marshall and Rotterdam CT scoring system in predicting clinical outcomes in TBI patients.

REVIEW OF LITERATURE

REVIEW OF LITERATURE

Globally, traumatic brain injury contributes significantly to morbidity, mortality, and economic burden. According to a systematic review, traumatic brain injury was more common in younger, economically productive age groups. Particularly high rates were discovered, along with the possibility of worse outcomes. Based on clinical and radiological criteria, TBI is categorized using several systems. The goal of these classification schemes is to forecast TBI outcomes. Nevertheless, no classification scheme is all-inclusive and incorporates every predictor. Cerebral compression syndrome and the resulting intracranial hypertension can cause clinical complications from traumatic brain injury. Massive bleeding may result in hypovolemic shock, which deteriorates the patient's prognosis, depending on the severity of TBI. Therefore, it is essential to have a scale that can correctly classify and measure the prognosis of TBI patients. The Mayo Classification System[19] developed a classification of TBI with 89% sensitivity and 98% specificity by including several predictors in the classification system to assess severity and predict brain injury. However, determining the GCS is complicated and sometimes impossible. This is because many patients are intubated, sedated, inebriated, or unable to speak or move. Therefore, CT is the preferred method of assessment for selection.

In 1991, Marshall et al. [1] described an imaging prognostic scale based on several features assessed in CT brains. This classification system is considered the gold standard for TBI classification. The International Guidelines for Prognosis of Severe Traumatic Brain Injury point to class I evidence for Marshall CT scoring as an important CT prognostic model for traumatic brain injury patients. Accordingly, in 2005, Maas et al.[3] determined a new prognostic classification by imaging that includes basal cisterns, midline, epidural hematoma, intraventricular, or subarachnoid haemorrhage (SAH), generating greater validation to define the mortality risk stratification or prognosis[3]. One of the significant differences between these two classifications is that the Rotterdam CT classification is stand-alone and does not require any intervention as one of the parameters in contrast to the Marshall score, where evacuation of the mass lesion is one of the measurements. The predictive power of these scoring systems depends on the outcome measured. Both scoring systems have similar mortality predictions, but only the Rotterdam scoring correlation with predicted outcomes is

measured as GOS. Also, none of the two scorings were found to have significant predictive power for outcome evaluated as Functional Independence Measure motor or cognitive domain at discharge or nine months follow-up. However, specific scores (Marshall 3 and 5, Rotterdam 5 and 6) were able to predict these outcomes and length of stay[3].

Following table outlines the differences between both the scoring systems[16].

Marshall CT classification	**Rotterdam CT classification**
More descriptive	More discriminative
Lacks individual CT characteristics	Individual CT characteristics present
Higher inter-rater reliability	Comparatively less inter-rater reliability
Predictive value is similar to Rotterdam CT score	Predictive value is similar to Marshall CT score
Predictive value is similar to Rotterdam CT score	Predictive value is similar to Marshall CT score
Uncertain predictive value in patients requiring decompressive craniectomy	Better predictive value in patients requiring decompres- sive craniectomy
Individual parameter of mass lesion evacuated/non evacuated is retrospective and hence has variable application	No such restriction on individual parameters measured
Patients with lower GCS are likely to have grade IV or V and hence no significant discriminatory predictive value in these cases	Prognosis can be discriminated even in patients with low GCS based on individual CT characteristics
Not ordinal	Ordinal

Predictive Value of Rotterdam CT Scoring System

Huang et al. [5] evaluated the efficacy of Rotterdam scoring in predicting outcome and mortality after decompressive craniectomy (DC) in TBI. They reported that the Rotterdam score is an independent predictor of unfavourable outcomes defined by GOS of 1 to 3, with an odds ratio of 1.830, 95% confidence interval of 1.043 to 3.212, and p = 0.035.20. The study by Huang et al. highlights an essential limitation of Marshall scoring and the utility of Rotterdam scoring in prognosticating TBI patients requiring DC. In the study by Huang et al., 90% of patients requiring DC belong to Marshall class V.

Mohammadifard et al.[4] conducted a comparative study of Marshall and Rotterdam scoring systems in predicting early deaths after brain trauma in a cohort of 150 patients. The mean age was 43.36 ± 21.65 years, the mean GCS was 8.7 ± 3, and the mean Marshall and Rotterdam CT scores were 3.2 ± 1.3 and 2.5 ± 1.0, respectively, in this study.15 They found a significant correlation between the Rotterdam score and mortality at two weeks, one month, and after three months; however, no such correlation was found with the Marshall score. Sensitivity and specificity for mortality prediction at two weeks for Rotterdam and Marshall scores were 56, 94.11%, and 87.34, 52.63%, respectively, and 57.69, 94.44%, and 87.34, 52.63%, at one month, respectively. Sensitivity and specificity for mortality prediction at two weeks for Rotterdam and Marshall scores were 57.69, 94.44%, and 87.17, 50%, respectively. The receiver operating characteristic (ROC) area under the curve (AUC) showed higher accuracy in predicting mortality at two weeks, one month, and three months for the Rotterdam score compared to the Marshall score.

In a similar study, Waqas et al. [37] found that the Rotterdam score has significant independent predictive value for mortality and unfavourable outcomes in TBI patients requiring DC. Therefore, Rotterdam CT scoring would have more discriminatory predictive strength in these patients.

Mass et al. [2] reported in their study on the efficacy of the Marshall CT scoring system that a combination of individual CT findings, additional CT findings like the presence of traumatic SAH, and a detailed description of mass lesions predicts outcomes better than the Marshall CT scoring

system. Marshall classification was not intended to be a prognostic model, and thus Mass et al. compared it with a model comprising of individual CT characteristic findings and reported the Rotterdam score to be a better prognostic model.

In the observational study by Pargaonkar et al. [15], researchers found that the Rotterdam score had a better linear relationship between scoring and mortality than the Marshall CT score. Similar findings were obtained in the study by Munakomi et al. [9]. Also, the positive predictive value for predicting mortality was higher for Rotterdam scoring (82.5%) than the Marshall CT scoring system (79.3%). Similar results were reported, with the highest accuracy for the Rotterdam CT score in predicting the outcome based on GOS at 3 and 6 months (AUC 0.722) compared with the Marshall score (AUC 0.657).

Nelson et al. [23] reported better predictive power of CT characteristics of the Rotterdam score than the Marshall score in an extended analysis of CT scans. They further suggested that the most critical parameter in predicting mortality is the magnitude of midline shift, which is a continuous variable.

Limitations of the Rotterdam CT Scoring System

One drawback of the Rotterdam scoring is that the authors used CT scans performed within 4 hours after admission rather than the worst CT scans [16]. Another limitation is that a patient with mild head trauma reported by Mass et al. [3] was excluded from the study, so Rotterdam CT scoring may not be applicable to predict these patients who may show neurological deterioration over time. In the Rotterdam score, midline shift and basal cistern status are key features of his CT, so inter-rater variability is a concern if his CT scans are evaluated by physicians with different expertise. Studies have reported higher interclass correlations for Marshall scoring compared to Rotterdam scoring. This classification does not predict long-term rehabilitation for patients with TBI or clinical outcomes for patients with penetrating TBI.

Predictive Value of the Marshall CT Scoring System

Mass et al. [3] reported an excellent predictive value for the Marshall CT scoring model, which can be enhanced by combining individual characteristics. Marshall's score is validated and widely used for the prediction of mortality and functional outcomes, which are lacking in the Rotterdam score. In the study by Deepika et al. [8],12 authors found that the Rotterdam score had similar accuracy to the Marshall score and was not superior. Majdan et al. compared ROC AUC for the predictive value of Rotterdam and Marshall scores and reported similar performance for the two scores [16]. Similar results were found in another study by Charry et al.[6]

Mata-Mbemba et al. [7] reported that the Marshall score has as good predictive power as the Rotterdam score. Although Mata-Mbemba et al. included a large number of patients, their study has a high risk of bias due to the concealment of allocation. This could limit the validation of their conclusion. Munakomi et al. [9] highlighted the importance of mortality prediction of Marshall score (0% for 1, 2, and 4, 40% for 3, 18.79% for 5, and 95.66% for 6) and the importance of evacuation of mass lesions.

Limitations of the Marshall CT Scoring System

The problem with Marshall scoring is that it is more descriptive than discriminatory as most of the patients requiring DC belong to Marshall class IV or V. Therefore, it is not possible to use it as a predictor for mortality in these cases accurately [16]. Marshall's CT score is based on data collected between 1984 and 1987 from 753 Traumatic Coma Data Bank patients, which is much less than the number of patients in the study for the Rotterdam score. The predictor of hematoma evacuated or non-evacuated can only be applied retrospectively. The cutoff of 25 mL is not uniform for the traumatic intracranial lesions, as guidelines differ for different pathologies. It is expected that mortality in patients with Marshall grade V will be lower than in patients with grades IV and VI, as it includes evacuated mass lesions. Also, in any study, patients with Marshall score IV are likely to be less in number as many patients with midline shifts may require surgery irrespective of GCS, and this practice varies among the surgeons and centres. This highlights a critical scenario where

predictions based on Marshall scores should be performed with caution [16]. This is because scores and prediction results can change over time. They further found that based on the first and 24-hour CT scans, the Rotterdam score was significantly negatively correlated with GOS.

In contrast, the Marshall score was associated with the first CT scan but not with the single 24-hour CT scan performed, and it was reported that they found a negative correlation. Similar to the Rotterdam classification, this classification cannot predict long-term rehabilitation in patients with TBI or clinical outcomes in patients with penetrating TBI. Marshall CT scoring is unsuitable as a prognostic model for TBI patients requiring DC [16].

COMPARATIVE STUDIES OF BOTH SCORING SYSTEMS

Mata mmbeba et al. [7] (2014) conducted a study on Marshall and Rotterdam CT Scoring Systems Compared in the Major Academic Tertiary Care Hospital in Northeastern Japan; this study concluded that More deaths occurred among patients with higher Marshall and Rotterdam scores (both $P < .05$, Mann–Whitney U test). The areas under the receiver operating characteristic curve (AUCs) indicated that both scoring systems had similar discriminative power in predicting early death (Marshall, AUC = 0. 85 vs. Rotterdam, AUC = 0.85). Basal cistern absence (odds ratio [OR] = 771.5, $P < .0001$), positive midline shift (OR = 56.2, $P = .0011$), hemorrhagic mass volume 25 mL (OR = 12.9, $P = .0065$), and intraventricular or subarachnoid haemorrhage (OR = 3.8, $P = .0395$) were independent predictors of early death. Both Marshall and Rotterdam scoring systems can be used to predict early death in patients with TBI. The performance of the Marshall score is at least equal to that of the Rotterdam score. Thus, although the Marshall score is older, it remains helpful in predicting patients' Prognosis.

Deepika et al (2015)[8] conducted a study on the Comparison of the predictability of the Marshall and Rotterdam CT scan scoring system in determining early mortality after traumatic brain injury. A total of 134 patients, with a mean age of 38.3 (±15.7) years, were recruited for the study. The overall mortality was 11.2 %. The mean GCS of these patients was 9.6 (±2.3). There was a good correlation between Marshall and Rotterdam grading, $r = 0.68$ (significant at 0.01 level). The

Marshall CT classification had reasonable discrimination (AUC - 0.707), and the Rotterdam grading had good discrimination (AUC - 0.681). This study concluded that Marshal and Rotterdam grading systems are suitable for predicting early mortality after moderate and severe TBI. The Rotterdam system also includes additional variables like subarachnoid haemorrhage so that it may be preferable, particularly in patients with diffuse injury.

Munakomi et al. (2016)[9] conducted a study on a comparative study between Marshall and Rotterdam CT scores in predicting early deaths in patients with traumatic brain injury in a major tertiary care hospital in Nepal. This study concluded that Marshall's CT classification has strong predictive power. However, more excellent discrimination can be obtained if the individual CT parameters underlying the CT classification are included in a prognostic model, such as the Rotterdam score. Consequently, we recommend using individual characteristics rather than the CT classification for prognostic purposes. The performance of CT models for predicting outcomes in TBI can be significantly improved by including more details of variables and by adding other variables to the models.

Mohammadifard et al (2018)[4] conducted a study on Marshall and Rotterdam Computed Tomography scores in predicting early deaths after brain trauma. This study concluded that The Marshall CT score was more accurate for the prediction of mortality at 2 weeks, at one month, and at three months than The Marshall CT score with higher ROC. The correlation of the Rotterdam CT score with mortality was significant.

AMP Siahaan Et al (2018)[10] conducted a study on The role of the Marshall and Rotterdam score in predicting the 30-day outcome of traumatic brain injury and concluded that there was a significant correlation between Marshall and Rotterdam CT scores with the 30-day outcome. Because of their applicability, we recommend using the Marshall and Rotterdam CT scores in the initial assessment to predict the 30-day outcome in patients with TBI.

Frodsham et al. (2020)[11] conducted a study on Day-of-Injury Computed Tomography and Longitudinal Rehabilitation Outcomes: A Comparison of the Marshall and Rotterdam Computed

Tomography Scoring Methods. It showed that Neither the Marshall Classification System nor the Rotterdam scales significantly predicted Functional Independence Measure motor or cognitive outcomes at discharge or 9-mo follow-up. Both scales, however, predicted the length of stay in rehabilitation. Specific Marshall and Rotterdam scores significantly predicted subacute outcomes such as Functional Independence Measure cognitive at discharge from rehabilitation and length of stay. This study concluded that the Marshall Classification System and Rotterdam scales may have limited utility in predicting long-term functional outcomes, but specific Marshall and Rotterdam scores, primarily linked to increased severity and intracranial pressure, may predict subacute outcomes.

Ranjeet kumar Jha et al. (2020)[14] Conducted a study on Assessment of Rotterdam Vs Marshall CT Grading for the Prognosis of Head Injury; this study concluded that This study concluded that The Marshall CT score was more accurate for prediction of mortality at two weeks, at one month, and at three months than The Marshall CT score with higher ROC. The correlation of the Rotterdam CT score with mortality was significant.

Mohammad Asim et al (2021)[12] et al. conducted a study on Rotterdam and Marshall Scores for Prediction of in-hospital Mortality in Patients with Traumatic Brain Injury: An observational study. A total of 1035 patients with TBI were included, with a mean age of 30 years. The mean Rotterdam and Marshall scores were higher among non-survivors ($p = .001$). Patients with higher Rotterdam (>3) or Marshall (>2) CT scores were older, had higher injury severity scores and in-hospital mortality and had lower GCS and blood ethanol levels than those with lower scores. The cutoff point of the Rotterdam score was 3.5 (sensitivity, 61.2%; specificity, 85.6%), and the Marshall score was 2.5 (74.3% sensitivity and 76.3% specificity). Multivariable logistic regression analyses showed that Marshall and Rotterdam scoring systems were independent predictors of mortality (odds ratio 8.4; 95% confidence interval 4.95–14.17 and odds ratio 4.4; 95% confidence interval 2.36–9.39, respectively). This study concluded that Rotterdam and Marshall CT scores have independent prognostic values in patients with TBI even in alcoholic patients.

Ricardez-Cazares LG et al. (2021)[13] Conducted a study on Rotterdam vs. Marshall Comparing Outcome Predictors in Traumatic Brain Injury with Computerized Tomography and concluded that

Both scales show adequate discriminative power to predict outcomes concerning severe disability, vegetative state and death in patients with traumatic brain injury and can be used in a clinical setting with confidence.

Maas et al.[3] reported better predictive value for the Rotterdam scoring system than the Marshall score in TBI patients. However, another study in 2014 demonstrated good discriminatory power for both systems in early mortality prediction. Given the dearth of extensive research comparing the Glasgow Coma Scale with the Rotterdam scoring system for predicting mortality in trauma patients, this study was conducted to determine which scale provides a more realistic prediction of mortality in trauma patients after three months.

A combination of clinical parameters, severity, ischemic and hemodynamic parameters, and a CT scoring system could predict the Prognosis of TBI patients with significant accuracy. Marshall scoring is more descriptive, widely accepted, has good predictive value, and has good inter-rater reliability. The Rotterdam score is superior in describing the dynamics of intracranial changes. Though most studies show that Rotterdam CT scoring is better than the Marshall CT scoring, we believe the two scoring systems are complimentary[16]. As both scoring systems have limitations and the Rotterdam CT scoring system improvises upon Marshall CT scoring, a combination approach would yield a better predictive model. Further prospective comparative studies in mild TBI patients and pediatric and geriatric TBI patients are required to establish their broader applicability. Hence, this study aimed to compare scoring systems, predictive powers, and their utility in practice.

AIMS AND OBJECTIVES

AIMS AND OBJECTIVES:

1. This study aims to determine the values of Marshall and Rotterdam scoring systems.
2. To predict the early outcome in traumatic brain injury patients based on the CT scores.
3. To determine the efficacy of the scoring systems in predicting early outcomes and Compare them.
4. To analyze the better scoring system for the Prognosis and predictability for assessing outcomes and manage accordingly.

OUTCOMES MEASURED :

Primary Outcome: Comparison of the Marshalls and Rotterdam scoring system approaches in predicting early outcomes and their efficacy.

Secondary Outcome: Analyzing the better scoring system for the Prognosis and predictability for assessing outcomes and managing accordingly.

MATERIALS AND METHODS

MATERIALS AND METHODS

Study Design: Hospital based observational Prospective study

Study setting: Patients with traumatic brain injury in the department of Neurosurgery and emergency services of AIIMS Bhopal.

Study Period: Entire study is conducted for a period of 1 year from the date of obtaining ethical clearance. The retrospective data from follow-up patients of TBI in Neurosurgery department is included.

Sample size: we aimed to study 127 patients coming to Trauma emergency of Aiims bhopal.

Sampling Technique: All patients coming to emergency and department of neurosurgery of AIIMS Bhopal will be recruited for the study.

Study unit: Patients presenting to the emergency and admitted to department of neurosurgery.

Inclusion criteria:

Patients older than 5 years of age with recent head blunt trauma (e.g., fall, driving accidents or others) within the last 24 hours, and GCS ≤13 with abnormal CT scan.

Exclusion criteria:

Patients under the age of 5 years, lack of single blunt head injury (including multiple trauma, penetrating lesions), no referral within the first 24 hours, and GCS ≥14. Other exclusion criteria included history of anticoagulant drugs, pregnancy, underlying cerebral disease (brain tumors or ischemic and hemorrhagic lesions), lack of information or imaging, dissatisfaction.

Data collection

After taking ethical committee clearance, study was started. All the patients with only traumatic brain injury attending to emergency in AIIMS BHOPAL following above inclusion criteria were recruited.

Written informed consent was obtained from all patients. All emergency procedures were performed by emergency specialists and neurosurgeons on duty based on scientific indications. Their initial CT and status at hospital discharge (dead or alive) were reviewed, and both CT scores were calculated. We examined whether each score is related to early death; compared the two scoring systems performance in predicting early death, and identify the CT findings that are independent predictors for early death.

Questionnaires / scales/ scoring systems used in study

MARSHALL CLASSIFICATION OF TBI

The Marshall system places patients into one of six categories (I to VI) of increasing severity on the basis of findings on non-contrast CT scan of the brain. Higher categories have worse prognosis and survival. It is primarily concerned with two features: degree of swelling, as determined by midline shift and/or compression of basal cisterns, presence and size of contusions/haemorrhages referred to "high or mixed density lesions". Classification includes-

diffuse injury I (no visible pathology)	no visible intracranial pathology
diffuse injury II	midline shift of 0 to 5 mm, basal cisterns remain visible ,no high or mixed density lesions >25 cm3
diffuse injury III (swelling)	midline shift of 0 to 5 mm basal cisterns compressed or completely effaced no high or mixed density lesions >25 cm3

diffuse injury IV (shift)	midline shift >5 mm, no high or mixed density lesions >25 cm3
evacuated mass lesion V	any lesion evacuated surgically
non-evacuated mass lesion VI	high or mixed density lesions >25 cm3 not surgically evacuated

Early poor prognosis rate was taken according to the multi factorial study on the following table

Marshall CT class	***Early poor prognosis rate(%)***
I	16.7
II	25.0
III	39.5
IV	48.1
V	71.4
VI	76.0
≥IV	65.0
<IV	29.5

ROTTERDAM CT SCORE OF TBI

The Rotterdam CT score of traumatic brain injury is a relatively recently described classification aimed at improving prognostic evaluation of patients admitted with moderate or severe traumatic brain injuries. The Rotterdam classification includes four independently scored elements. Like the Marshall system, it includes 1) degree of basal cistern compression and 2) degree of midline shift. It does not, however, include contusions, but rather restricts mass lesions to 3) epidural haematomas, and adds 4) intraventricular and/or subarachnoid blood.

Each of these is given a score, and these scores are tallied, with the addition of 1 to the total. In other words, a completely normal appearing scan has a Rotterdam score of 1 and the worst possible score is 6. To the sum of the score a plus 1 must be added, which makes it comparable to the Marshall system.

Classification

	0	1	2
BASAL CISTERNS	NORMAL	COMPRESSED	ABSENT
MIDLINE SHIFT	NO SHIFT OR <=5MM	SHIFT >5MM	
EPIDURAL MASS LESION	PRESENT	ABSENT	
INTRAVENTRICULAR BLOOD OR TRAUMATIC SAH	ABSENT	PRESENT	

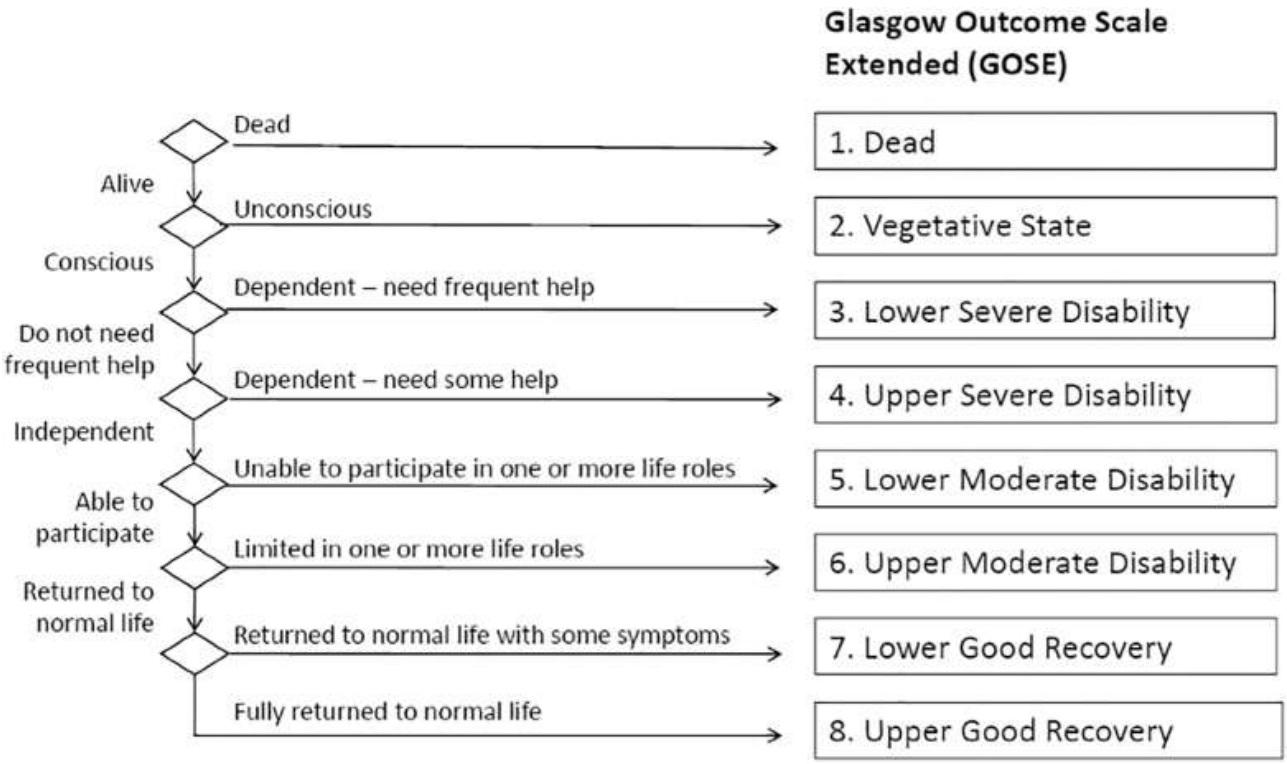
Prognosis

In adults the mortality at six months increases with the score 1:

- score 1: 0%
- score 2: 7%
- score 3: 16%
- score 4: 26%
- score 5: 53%
- score 6: 61%

Children have lower mortality in lower Rotterdam scores (scores 2 and 3), and higher mortality at higher scores (scores 4 to 6).

Both scores are calculated and patients are followed up at 3 months and 6 months with GOSE Score and categorised accordingly.



Plan of Statistical Analysis:

The data was collected in MS Excel. Statistical analysis was performed using the software Statistical Package for the Social Sciences (SPSS) Version 24. An unpaired t-test was used to compare two independent continuous variables, a Paired t-test was used to compare two dependent continuous variables, Logistic Regression was used for the dichotomous and continuous variables, and the Correlation test was used to find the relation between the variables. Results were expressed in mean and standard deviations for continuous variables and frequency and percentages for categorical variables. A P Value of less than 0.05 was considered statistically significant. We calculated the areas under the receiver operating characteristic curve (AUCs) to quantify the comparative performance of the two CT scoring systems in predicting early death. A p value less than 0.05 was considered statistically significant.

OBSERVATIONS AND RESULTS

OBSERVATIONS

1. Total of 127 patients were included in the study. Mean age of the study population is 34.3.

2. Out of 127 patients , 1 patient lost followup at 3 months and 2 patients lost followup at 6 months.

3. Following table 1 shows the mean of Marshalls and Rotterdam scoring systems of the given population.

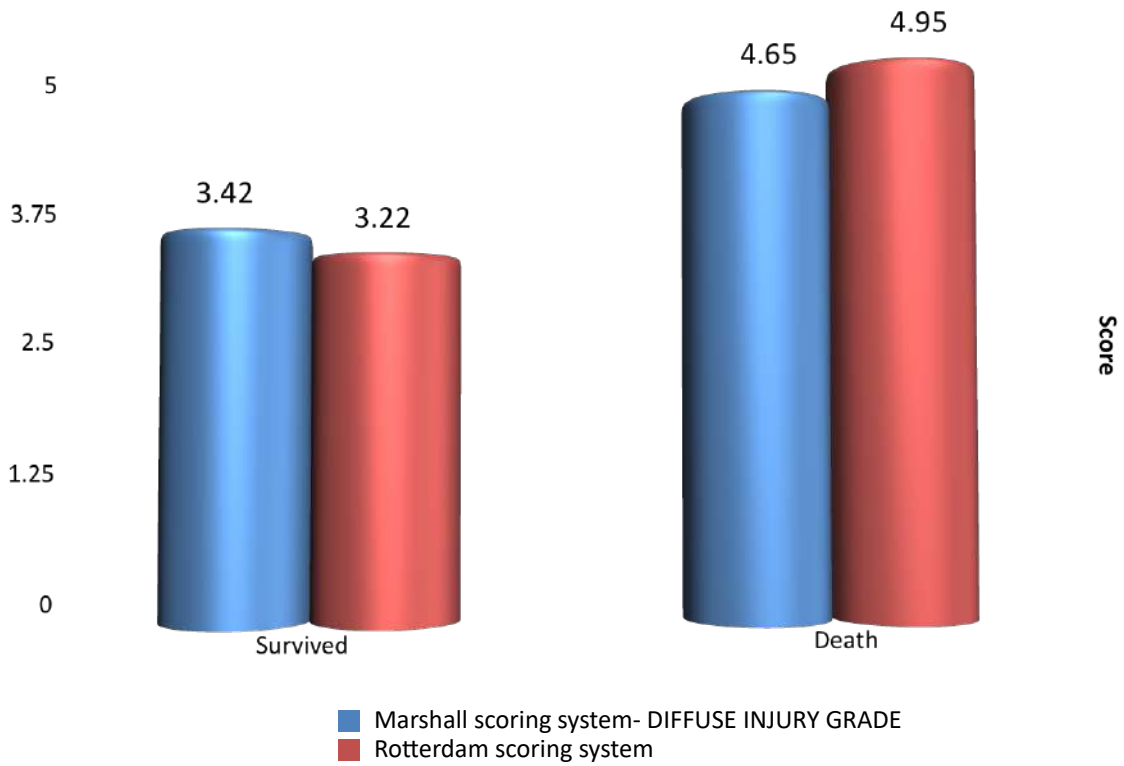
4. TABLE 1 shows the mean average of GOSE score which is 4.5 in study population, GCS score at the time of admission average is 8.3 and at discharge is 9.1. .

5. This table shows the standard deviation and mean values of the Characteristics of the population .

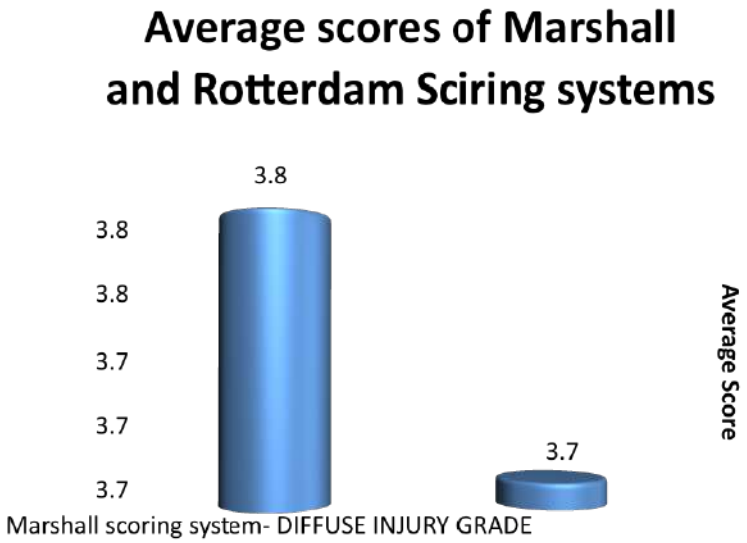
6. Bar graphs of mean of all these characteristics are shown in bar graph 1 -3 .

	N	Minimum	Maximum	Mean	Std. Deviation
Age	127	7	74	34.3	13.6
GCS_Score at admission	127	3	15	8.3	3.3
Marshall scoring system-DIFFUSE INJURY GRADE	127	1	6	3.8	1.4
Marshall scoring system prediction of poor prognosis%	127	25	76	51.2	20.1
Rotterdam scoring system	127	1	6	3.7	1.2
Rotterdam scoring system prediction of poor prognosis	127	7	61	28.2	18.4
GCS_Score at discharge	127	0	15	9.1	6.3
Followup at 3 months-GOSE SCORE	126	1	8	4.5	2.8
Followup at 6 months -GOSE SCORE	125	1	8	5.1	3.2

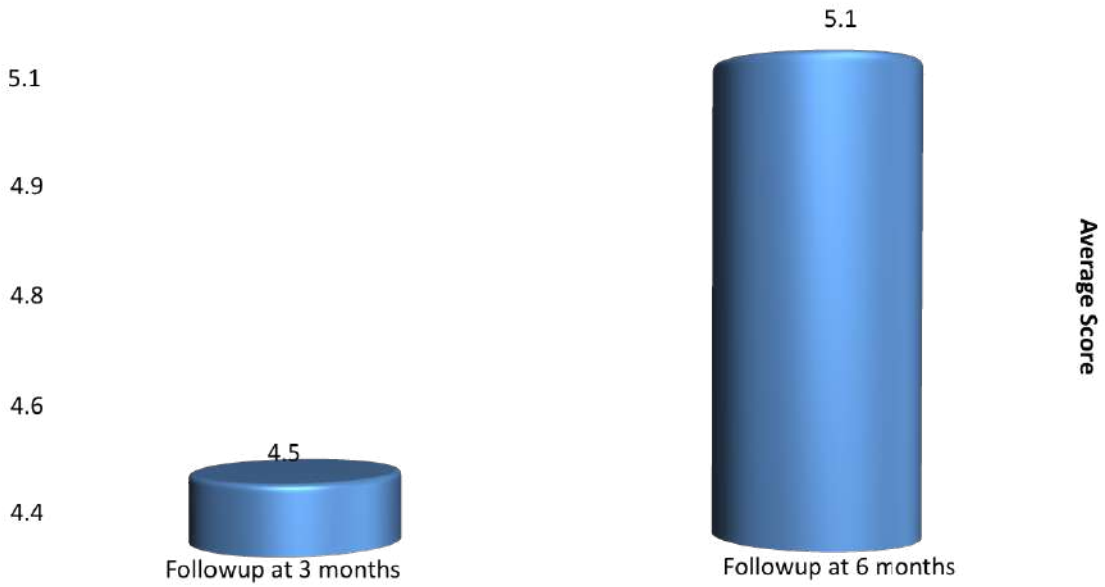
TABLE 1 SHOWING DEMOGRAPHIC CHARACTERISTICS OF STUDY POPULATION



BAR GRAPH 1 SHOWING CORRESPONDING TO TABLE 1



BAR GRAPH 2



BAR GRAPH 3

7. Out of 127 patients , survival rate is 71 % and mortality is 29% shown in table 2.

Outcome	Frequency	%
Survived	90	71%
Death	37	29%
Total	127	100%

TABLE 2 SHOWING FREQUENCY OF SURVIVED AND DEATH IN STUDY POPULATION

8. Age variations in the study populations are shown in table 3, most common observed is 21-30years age.

Age	Frequency	%
<= 20 Years	14	11%
21 - 30 Years	51	40%
31 - 40 Years	23	18%
41 - 50 Years	22	17%
51 - 60 Years	10	8%
> 60 Years	7	6%
Total	127	100%

TABLE 3 SHOWING AGE CHARACTERISTICS AND VARIATIONS

9. Study population has majority of male population of 82 % shown in table 4.

Sex	Frequency	%
Male	104	82%
Female	23	18%
Total	127	100%

TABLE 4 SHOWING MALE AND FEMALE POPULATION

10. Mean age of survived population is 32.7, death 37.9 shown in table number 5

11. Marshalls scoring system average was 3.4 in survived when compared to 4.6 in death patients.

12. Rotterdam scoring system average was 3.2 in survived when compared to 4.9 in death patients.

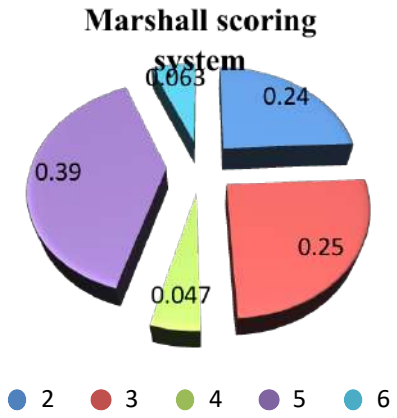
Outcome		N	Mean	Std. Deviation	t	P Value
Age	Survived	90	32.7889	12.25799	1.961	.052
	Death	37	37.9459	16.07611		
GCS_Score	Survived	90	9.5889	2.64318	9.266	.000
	Death	37	5.0000	2.24846		
Marshall scoring system-DIFFUSE INJURY GRADE	Survived	90	3.4222	1.28935	5.062	.000
	Death	37	4.6486	1.11096		
Marshall scoring system prediction of poor prognosis%	Survived	90	46.3889	19.78948	4.518	.000
	Death	37	62.9270	15.86988		
Rotterdam scoring system	Survived	90	3.2222	.89666	9.798	.000
	Death	37	4.9459	.91122		
Rotterdam scoring system prediction of poor prognosis	Survived	90	20.2444	12.47227	10.400	.000
	Death	37	47.7027	15.81466		
GCS_Score_Discharge	Survived	90	12.8111	2.89864	26.821	.000
	Death	37	0.0000	0.00000		
Followup at 3 months-GOSE SCORE	Survived	89	5.9888	1.97423	15.335	.000
	Death	37	1.0000	0.00000		
Followup at 6 months -GOSE SCORE	Survived	88	6.8864	1.97357	18.100	.000
	Death	37	1.0000	0.00000		

TABLE 5 SHOWING SCORING SYTEMS AND CHARACTERISTICS IN SURVIVED AND DEAD

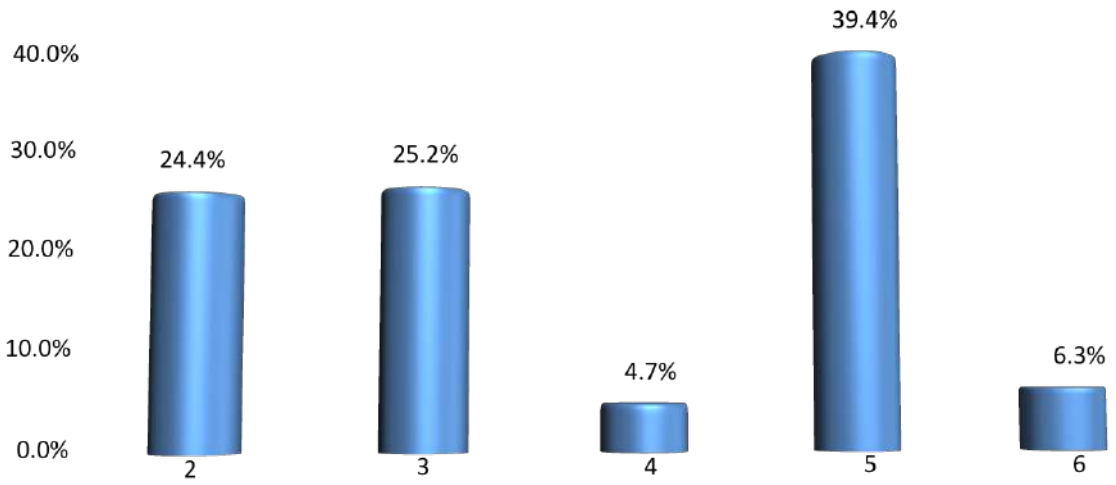
13. Frequency and variations of Marshalls scoring system shown in table 6 , Bar graph 4 and pie chart 1. Most frequent score is 5 with 39.4 %.

Marshall scoring system- DIFFUSE INJURY GRADE	Frequency	%
2.00	31	24.4%
3.00	32	25.2%
4.00	6	4.7%
5.00	50	39.4%
6.00	8	6.3%
Total	127	100.0 %

TABLE 6 SHOWING AVERAGE OF MARSHALL SCORING SYSTEMS



PIE CHART 1

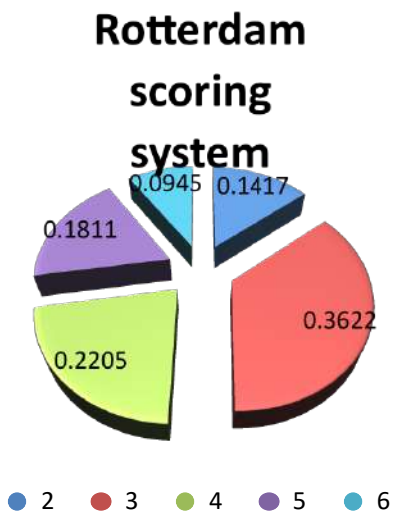


BAR GRAPH 4

14. Frequency and variations of rotterdam scoring system shown in table 7 , Bar graph 5 and pie chart 2. Most frequent score is 3 with 36.2%.

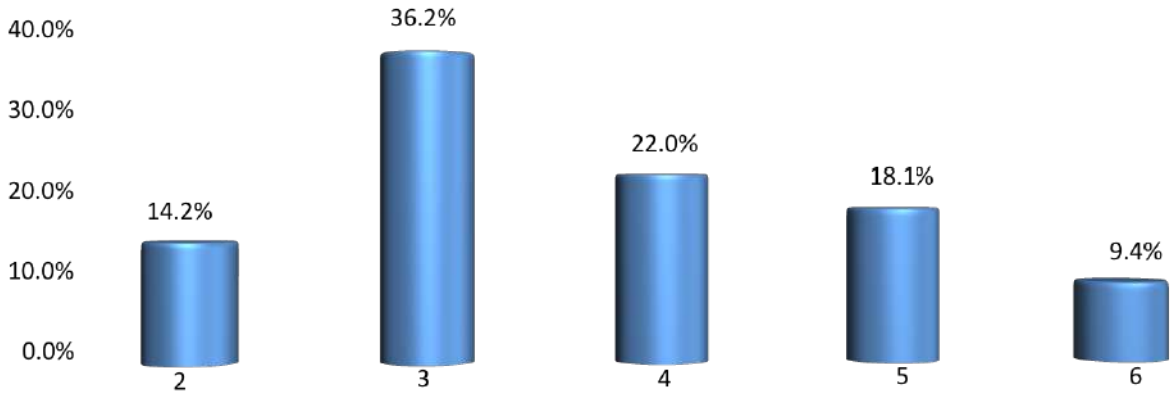
Rotterdam scoring system	Frequency	%
2.00	18	14.2%
3.00	46	36.2%
4.00	28	22.0%
5.00	23	18.1%
6.00	12	9.4%
Total	127	100.0 %

TABLE - 7 SHOWING AVERAGE OF ROTTERDAM SCORES



PIE CHART 2

Rotterdam scoring system BAR GRAPH 5



13. Outcome and correlation with scoring system are shown in table 8. Both scoring systems showed p value of 0.0010 and 0.0030 respectively with outcome which are significant.

	Outcome	
	r	P Value
Marshall scoring system- DIFFUSE INJURY GRADE	.412**	.0010
Rotterdam scoring system	.659**	.0030
GCS_Score	-.638**	.0070
GCS_Score_Discharge	-.923**	.0010
Followup at 3 months-GOSE SCORE	-.809**	.0002
Followup at 6 months -GOSE SCORE	-.853**	.0001
Marshall scoring system prediction of poor prognosis%	.375**	.0010
Rotterdam scoring system prediction of poor prognosis	.681**	.0010

TABLE 8 SHOWING OUTCOME RELATION OF SCORING SYSTEMS

14. Marshalls and rotterdams scoring system showed in table 9 and shown significant p value implying that the both systems are correlated.

		Rotterdam scoring system
Marshall scoring system- DIFFUSE INJURY GRADE	Pearson Correlation	.663**
	P Value	.0001

TABLE 9 SHOWING CORRELATION OF MARSHALLS SCORING SYSTEM WITH ROTTERDAM SCORING SYSTEM

OBSERVATIONS

1. Marshall scoring system with diffuse injury grade ROC curve , AUC was 74.8 %, P value was 0.001 which is significant ,sensitivity was 74.79 %, specificity was 72 % , accuracy was 83.80% (shown in Table 10 below)

ROC CURVE 1

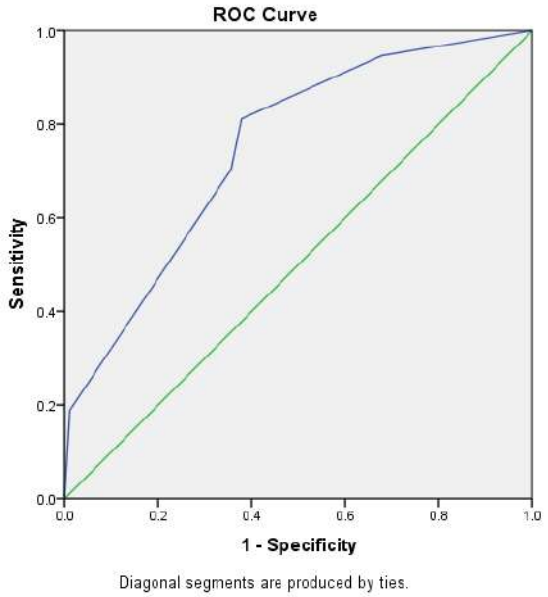


Table 10

Area Under the Curve	74.80%
P Value	0.001
Confidence Interval	65.8% to 83.9%
Cutoff Point	4
Sensitivity	74.79%
Specificity	72.00%
PPV	71.09%
NPV	89.41%
Accuracy	83.80%

2. Rotterdam scoring system ROC curve , AUC was 89.2 % , P value was 0.0004 which is significant ,sensitivity was 89.13 %, specificity was 77.14 % , accuracy was 80.63%. (Shown in table 11 below).

ROC CURVE 2

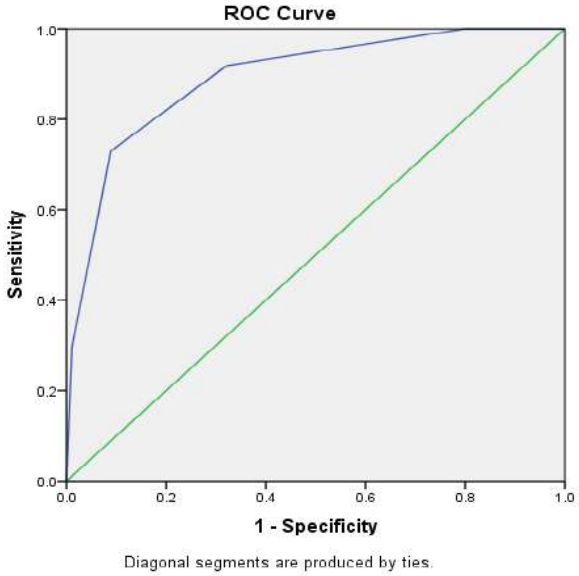


Table 11

Area Under the Curve	89.20%
P Value	0.0004
Confidence Interval	83.1% to 95.4%
Cutoff Point	4
Sensitivity	89.13%
Specificity	77.14%
PPV	61.58%
NPV	94.53%
Accuracy	80.63%

3. Sensitivity and specificity of Rotterdam scoring system was higher than Marshall scoring system.

4. Accuracy of both systems were almost same (Marshall's a bit high accurate) , 83.8 for Marshalls and 80.63 for Rotterdam scoring system.

5. Positive predictive value of Marshall scoring system is 71.09% and Rotterdams is 61.58.

6. PPV of Marshalls is higher than Rotterdam scoring system.

7. Negative predictive value of Marshalls scoring system is 89.4, Rotterdams is 94.3.

8. NPV of Rotterdam is higher than Marshalls scoring system.

9. Confidence interval of Marshall scoring system is 65.8 to 83.9%.

10.Confidence interval of Rotterdam scoring system is 83.1 to 95.4%.

11.P Value of Rotterdam is 0.0004 which is more significant when compared to P value of Marshalls which is 0.001 indicating more correlation with Rotterdam.

12.Followup with GOSE score at 3 month and 6 month correlation with Marshall scoring system 0.001 and 0.002 respectively.

13.Followup with GOSE score at 3 month and 6 month correlation with Rotterdam scoring system 0.004 and 0.006 respectively.

14.Marshalls scoring system correlation with GOSE score (P - 0.001,0.002)was more predictive for prognosis of the patients when compared to Rotterdam scoring system (0.004 and 0.004)

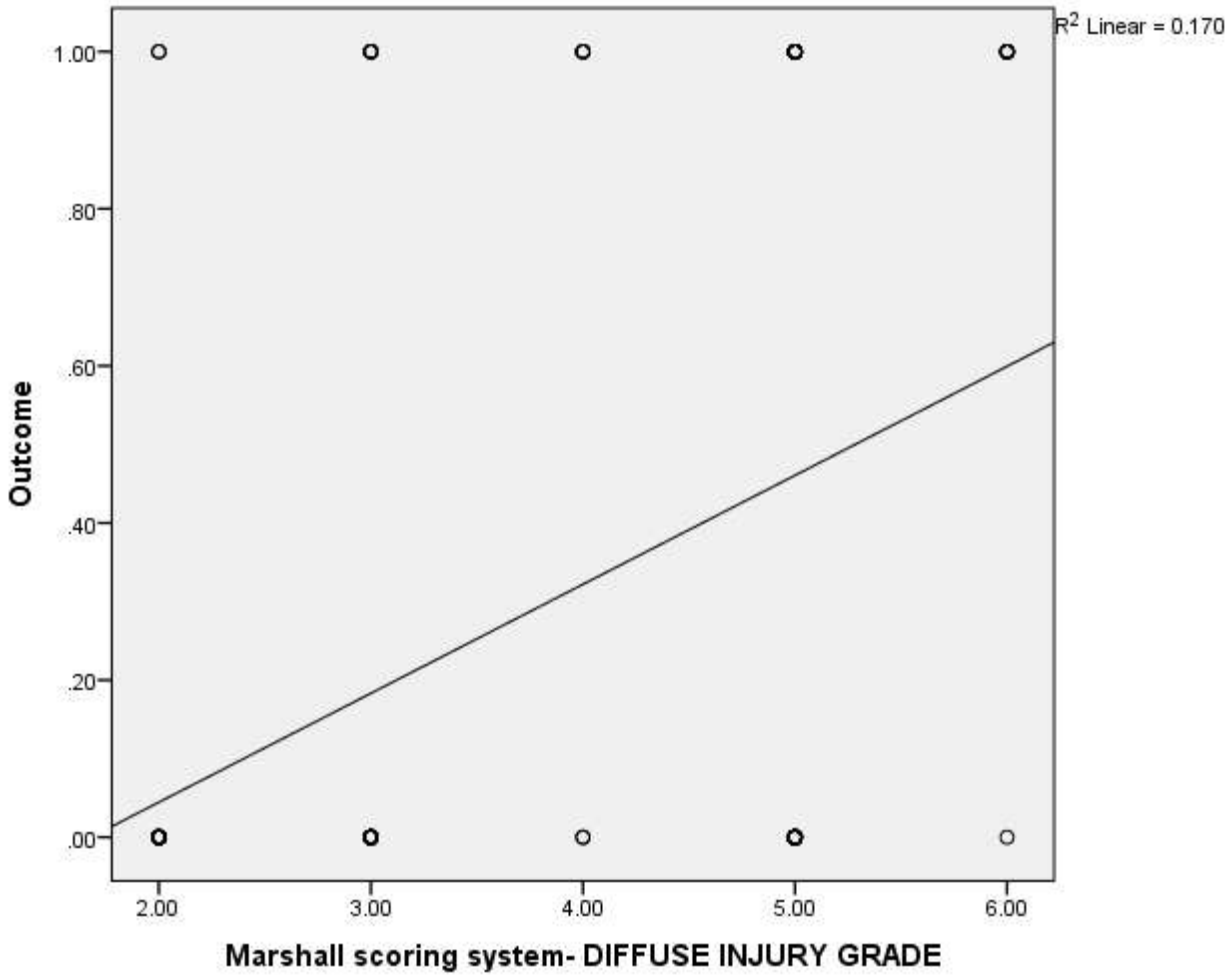
15.Accuracy of Marshall scoring system is slight more than Rotterdam scoring system.

16.Sensitivity and specificity of Rotterdam scoring system was higher than Marshalls scoring system.

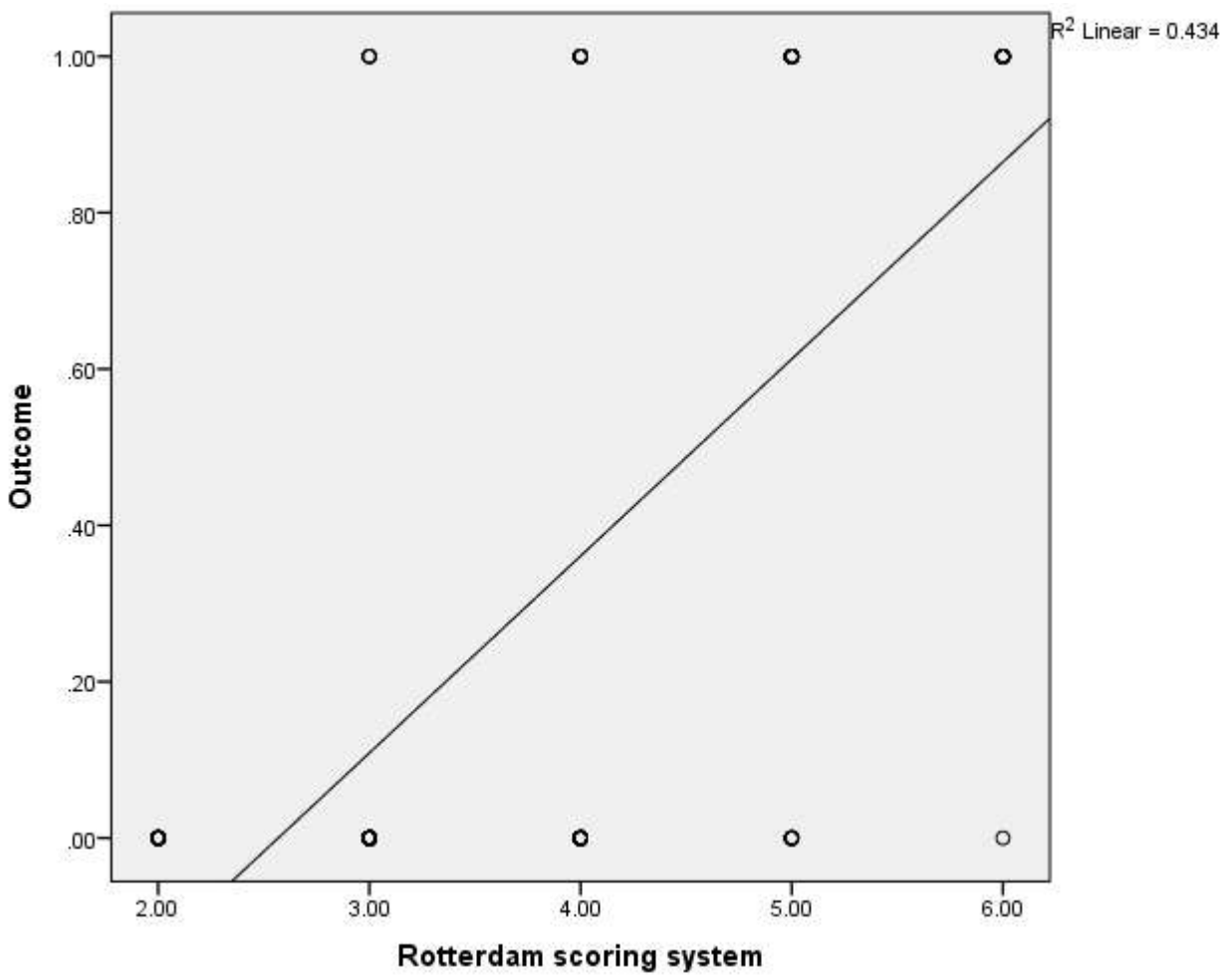
17.PPV of Marshalls is higher than Rotterdam scoring system.

18.NPV of Rotterdam is higher than Marshalls scoring system.

19.P Value of Rotterdam is 0.0004 which is more significant when compared to P value of Marshalls which is 0.001 indicating more correlation with Rotterdam.



SCATTER PLOT 1 SHOWING CORRELATION OF OUTCOME WITH MARSHALLS SCORING SYSTEM

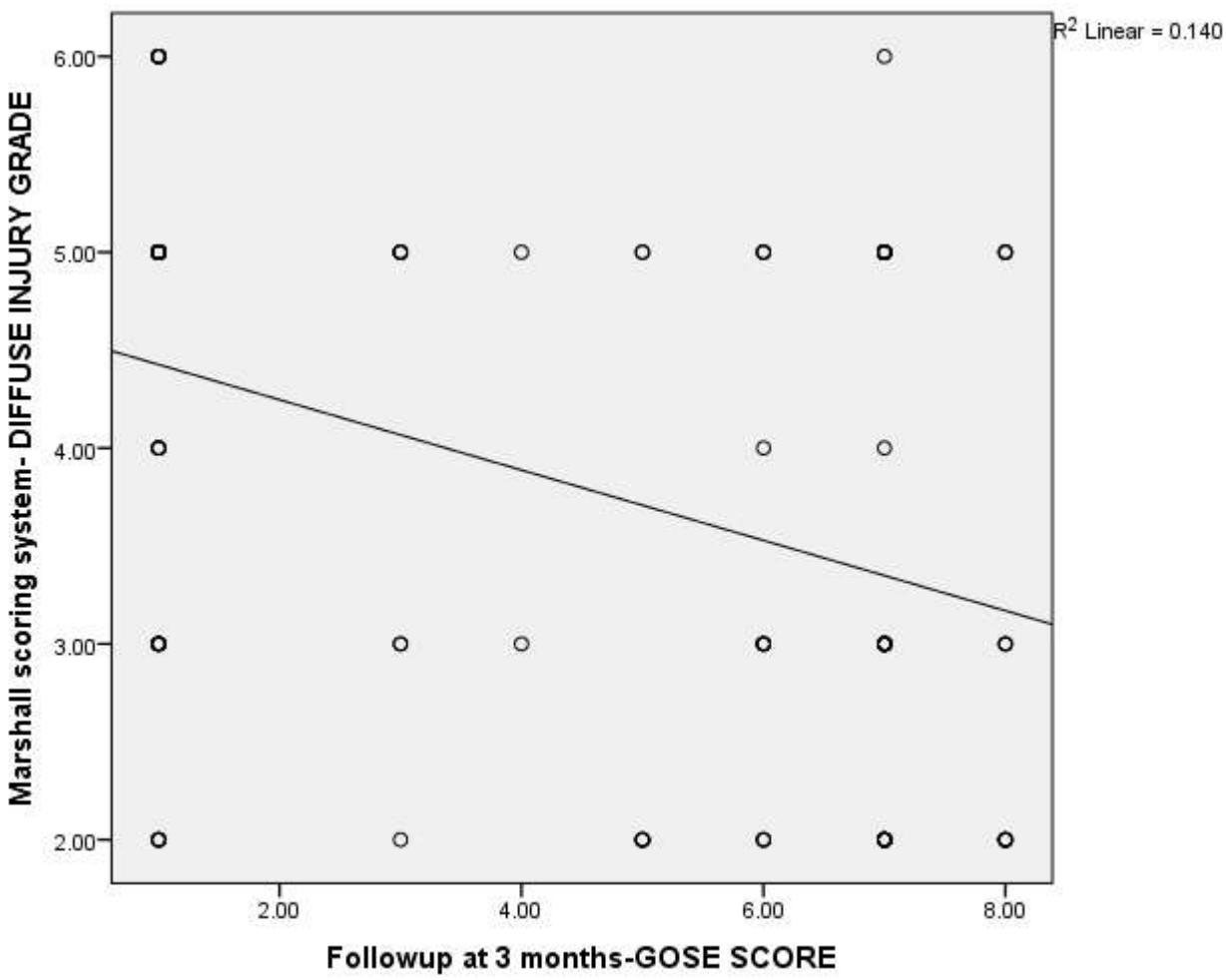


SCATTER PLOT 2 SHOWING CORRELATION OF OUTCOME WITH ROTTERDAM SCORING SYSTEM

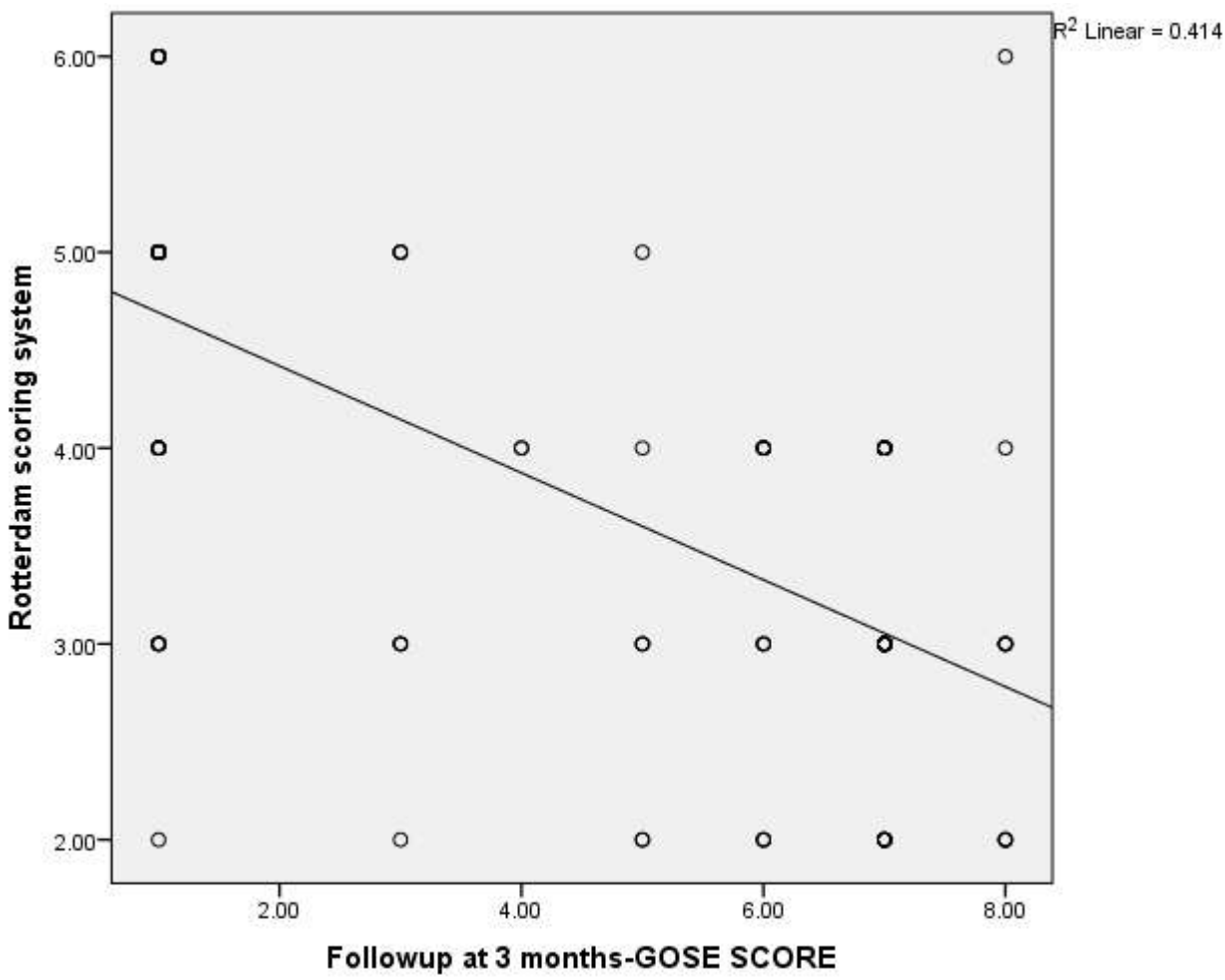
		Marshall scoring system-DIFFUSE INJURY GRADE	Rotterdam scoring system	Followup at 3 months-GOSE SCORE	Followup at 6 months -GOSE SCORE
Followup at 3 months-GOSE SCORE	Pearson Correlation	-.374**	-.643**	__	.968**
	P Value	.001	.004	__	.006
Followup at 6 months -GOSE SCORE	Pearson Correlation	-.405**	-.674**	.968**	__
	P Value	.002	.006	.006	__

TABLE 12 SHOWING GOSE SCORE CORRELATION WITH BOTH SYSTEMS

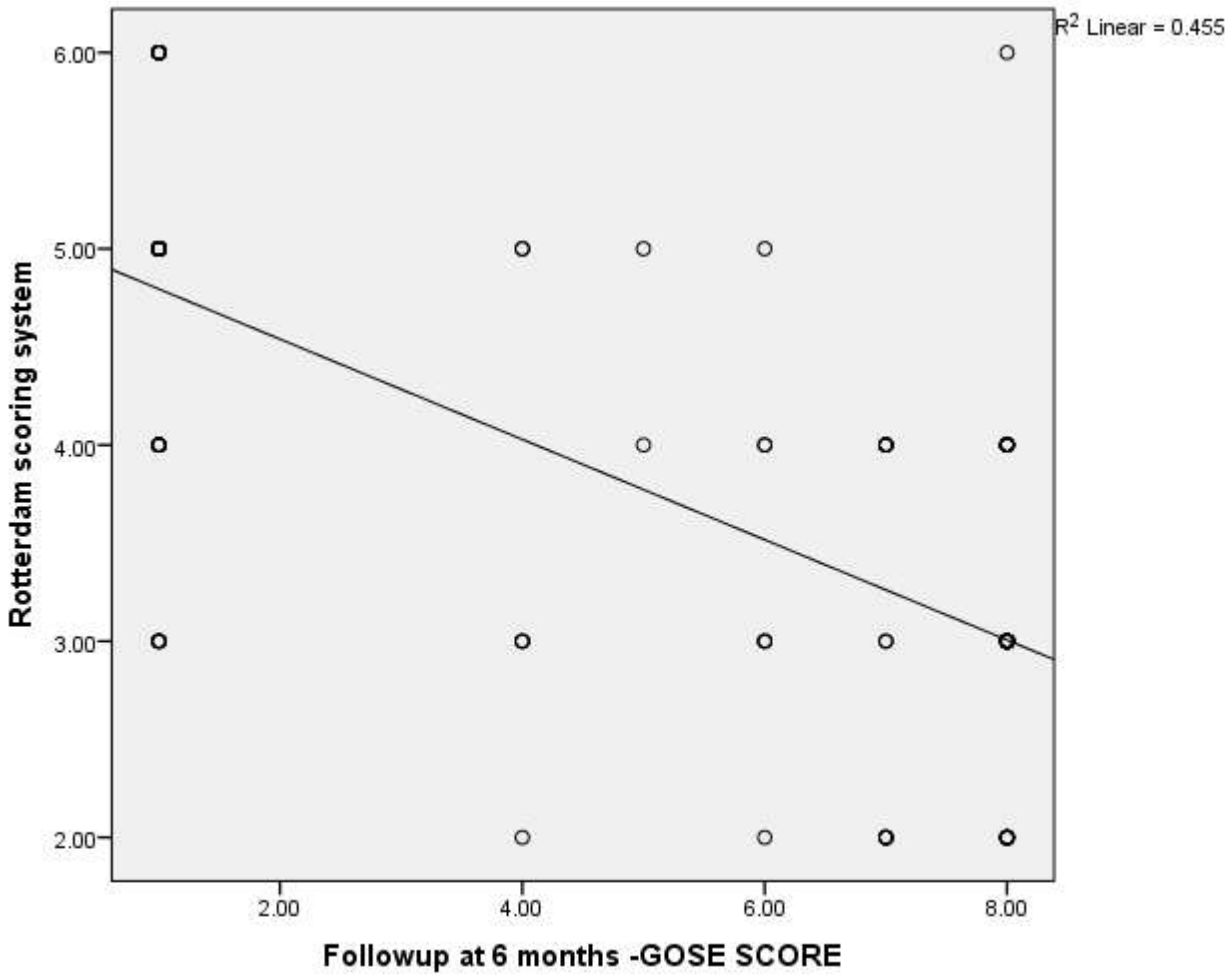
20. Marshalls scoring system correlation with GOSE score (P - 0.001,0.002) was more predictive and consistent for prognosis of the patients when compared to Rotterdam scoring system (0.004 and 0.004) shown in Table 12.



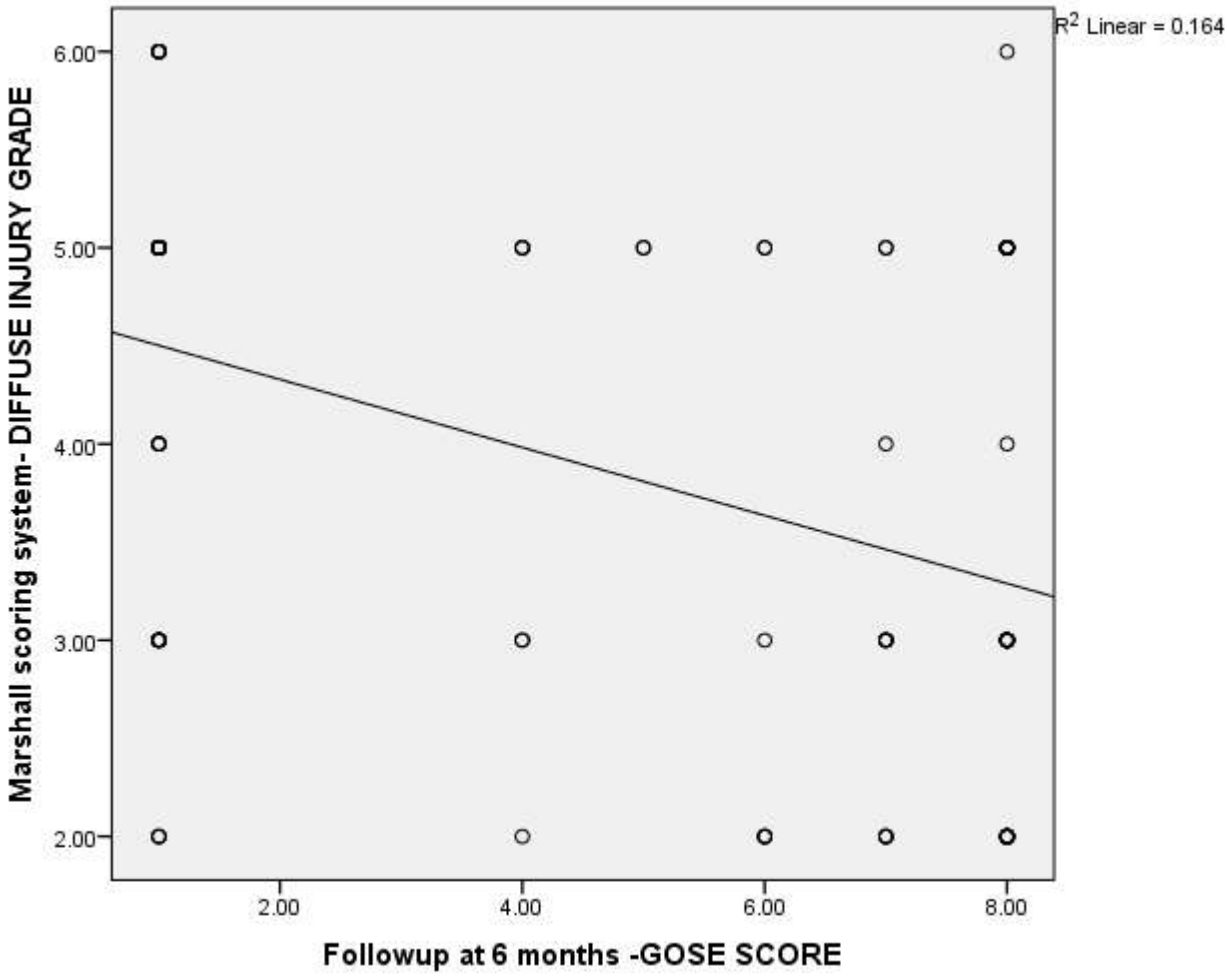
SCATTER PLOT 3 SHOWING THE CORRELATION OF MARSHALLS SCORING SYSTEM WITH GOSE SCORE AT 3 MONTHS



SCATTER PLOT 4 SHOWING THE CORRELATION OF ROTTERDAM SCORING SYSTEM WITH GOSE SCORE AT 3 MONTHS



SCATTER PLOT 5 SHOWING THE CORRELATION OF ROTTERDAM SCORING SYSTEM WITH GOSE SCORE AT 6 MONTHS



SCATTER PLOT 6 SHOWING THE CORRELATION OF MARSHALLS SCORING SYSTEM WITH GOSE SCORE AT 6 MONTHS

DISCUSSION

DISCUSSION

In our study, Marshall scored system with diffuse injury grade ROC curve, AUC was 74.8 %, P value was 0.001, which is significant, sensitivity was 74.79%, specificity was 72 %, and accuracy was 83.80% . Rotterdam scoring system ROC curve, AUC was 89.2 %, P value was 0.0004, significant, sensitivity was 89.13 %, specificity was 77.14 %, and accuracy was 80.63%. The sensitivity and specificity of the Rotterdam scoring system were higher than the Marshalls scoring system. Both systems accuracy was almost identical, 83.8 for Marshalls and 80.63 for the Rotterdam scoring system. The positive predictive value of the Marshall scoring system is 71.09%, and the Rotterdam is 61.58. The PPV of Marshalls is higher than the Rotterdam scoring system. The negative predictive value of Marshall's scoring system is 89.4, and Rotterdam is 94.3. The NPV of the rotter dam is higher than that of the Marshall scoring system. The confidence interval of the Marshall scoring system is 65.8 to 83.9%. The confidence interval of the Rotterdam scoring system is 83.1 to 95.4%. The P Value of Rotterdam is 0.0004, which is more significant when compared to the P value of Marshalls, which is 0.001, indicating more correlation with Rotterdam. Followup with GOSE score at three months and 6-month correlation with Marshall scoring system 0.001 and 0.002 respectively. Followup with GOSE score at three months and 6-month correlation with Rotterdam scoring system 0.004 and 0.006 respectively. Marshall scoring system correlation with GOSE score (P - 0.001,0.002)was more predictive for prognosis of the patients when compared to Rotterdam scoring system (0.004 and 0.006).

COMPARISON WITH OTHER STUDIES

Deepika et al (2015)[28] conducted a study on Comparison of predictability of Marshall and Rotterdam CT scan scoring system in determining early mortality after traumatic brain injury. A total of 134 patients, mean age 38.3 (±15.7) years, were recruited for study. The overall mortality was 11.2 %. The mean GCS of these patients was 9.6 (±2.3). There was good correlation between Marshall and Rotterdam grading, r = 0.68 (significant at 0.01 level). The Marshall CT classification had reasonable discrimination (AUC - 0.707), and Rotterdam grading had good discrimination (AUC - 0.681).This study concluded that Both Marshal and Rotterdam grading systems are good in

predicting early mortality after moderate and severe TBI. As the Rotterdam system also includes additional variables like subarachnoid hemorrhage, it may be preferable, particularly in patients with diffuse injury. Following table shows the minor differences between this study and the current study.

FINDINGS	CURRENT STUDY	DEEPIKA ET AL (2015)
N	**127**	134
MEAN AGE	**34.3**	38.3
MEAN GCS	**8.3**	9.6
MARSHALLS AUC	**0.74**	0.707
ROTTERDAM AUC	**0.89**	0.681

TABLE 13

Munakomi et al (2016)[31] conducted a study on A comparative study between Marshall and Rotterdam CT scores in predicting early deaths in patients with traumatic brain injury in a major tertiary care hospital in Nepal.This study concluded that Marshall CT classification has strong predictive power, but greater discrimination can be obtained if the individual CT parameters underlying the CT classification are included in a prognostic model as in Rotterdam score. Consequently, for prognostic purposes, we recommend the use of individual characteristics rather than the CT classification. Performance of CT models for predicting outcome in TBI can be significantly improved by including more details of variables and by adding other variables to the models. He concluded that Higher Rotterdam score has higher mortality but mortality prediction of score 5 was lesser than 4 or 6 with AUC of 0.912 for Marshall and 0.929 for Rotterdam scoring.

Following table shows the minor differences between this study and the current study.

FINDINGS	CURRENT STUDY	Munakmi et al (2016)
N	**127**	364

FINDINGS	CURRENT STUDY	Munakmi et al (2016)
MARSHALLS AUC	**0.74**	0.912
ROTTERDAM AUC	**0.89**	0.929

TABLE 14

Pargaonkar et al (2018) conducted a study on Comparative study of computed tomographic scoring systems and predictors of early mortality in severe traumatic brain injury, concluded that ROC analysis showed AUC, 0.742 for Marshall and 0.751 for Rotterdam CT scoring system Following table shows differences between the studies.

FINDINGS	CURRENT STUDY	PARGAONKAR ET AL 2019
N	**127**	157
MARSHALLS AUC	**0.74**	0.742
ROTTERDAM AUC	**0.89**	0.751

TABLE 15

AMP Siahaan Et al (2018)[14] conducted a study on The role of marshall and rotterdam score in predicting 30-day outcome of traumatic brain injury and concluded that there was a significant correlation between Marshall and Rotterdam CT Score with the 30-day outcome. Because of their applicability, we recommend the use of Marshall and Rotterdam CT Score in the initial assessment to predict the 30-day outcome in patients with TBI. This study concluded almost same correlation of both systems.

FINDINGS	CURRENT STUDY	AMP Siahaan Et al
N	**127**	102
MALES	**82**	78.4

FINDINGS	CURRENT STUDY	AMP Siahaan Et al
FEMALES	**18**	21.6
MORTALITY RATE	**29**	11.8
P VALUE OF MARSHALLS	**0.001**	0.0001
P VALUE OF ROTTERDAM	**0.0004**	0.0001

TABLE 16

Mohammadifard et al (2018) Marshall and Rotterdam Computed Tomography scores in predicting early deaths after brain trauma concluded that The Rotterdam CT score was significantly correlated with mortality at two weeks, one month and three months (p=0.004, p=0.001, and p=0.001, respectively). The Marshall CT score was not significantly correlated with mortality at any time. The Rotterdam CT score was more accurate for prediction of mortality on 2 weeks (ROC80.9), at one month (ROC80.7), and at three months were (ROC80.7) than The Rotterdam CT score (ROC 76, 74.1, and 74.1, respectively). This study concluded that The Marshall CT score was more accurate for prediction of mortality on 2 weeks, at one month, and at three months were than The Marshall CT score with higher ROC. The correlation of the Rotterdam CT score with mortality was significant.

FINDINGS	CURRENT STUDY	Mad fard et al 2018
N	**127**	98
MALES	**82**	63
FEMALES	**18**	37
MORTALITY RATE	**29**	20.4
MARSHALL SENSITIVITY	**74.79**	87
MARSHALL SPECIFICITY	**72**	50
ROTTERDAM SENSITIVITY	**89.13**	57.6
ROTTERDAM SPECIFICITY	**77.14**	94.4

FINDINGS	CURRENT STUDY	Mad fard et al 2018
AUC MARSHALL	**74.8**	74.1
AUC ROTTERDAM	**89.2**	80.7

TABLE 17

Ranjeet kumar Jha Et al (2020) Conducted a study on Assessment of Rotterdam Vs Marshall CT Grading for Prognosis of Head Injury, This study concluded that This study concluded that The Marshall CT score was more accurate for prediction of mortality on 2 weeks, at one month, and at three months were than The Marshall CT score with higher ROC. The correlation of the Rotterdam CT score with mortality was significant. Following table shows the differences with current study.

FINDINGS	CURRENT STUDY	Ranjeet kumar Et al
N	**127**	150
MALES	**82**	60
FEMALES	**18**	40
MORTALITY RATE	**29**	19.4
P VALUE OF MARSHALLS	**0.001**	No correlation
P VALUE OF ROTTERDAM	**0.0004**	0.0001
ROC	**74.8**	74.1
ROC	**89.2**	80.7

TABLE 18

Ricardez-Cazares LG Et al (2021)[55] Conducted a study on Rotterdam vs. Marshall Comparing Outcome Predictors in Traumatic Brain Injury with Computerized Tomography and concluded that Both scales show adequate discriminative power to predict outcomes with respect to severe disability, vegetative state and death in patients with traumatic brain injury and can be use in clinical setting with confidence.According to his study Both studies showed almost same AUC.

FINDINGS	CURRENT STUDY	Ricardez LG Et al
N	**127**	90
MALES	**82**	86.7
FEMALES	**18**	13.3
MORTALITY RATE	**29**	12.2
AUC MARSHALL	**74.8**	93.2
AUC ROTTERDAM	**89.2**	95.6

TABLE 19

Brijesh goswami et al 2023 conducted a study on Prediction of In-Hospital Mortality in Patients With Traumatic Brain Injury Using the Rotterdam and Marshall CT Scores: A Retrospective Study From Western India, concluded that The study was dominated by male patients (85.8%) as compared to female patients (14.2%). The overall mortality rate was 32.3% (n = 41). The mortality rate among males and females was 30.3% (33/109) and 44.4% (8/18), respectively. As per the Glasgow Coma Scale (GCS) classification, the severity of the injury was mild in 12.6% of the study subjects, moderate in 22%, and severe in 65.4%. The mortality rate among the patients with mild severity was 12.5% (2/16), while it was 28.6% in moderate (8/28) and 37.3% (31/83) in the severe category group. The best cut-off point of the Rotterdam score for predicting mortality was >4 (as per the Youden Index), which had a sensitivity and specificity of 60.98% and 90.70%, respectively, while the cut-off point of the Marshall CT classification for predicting mortality was >3 (as per the Youden Index), which had a sensitivity of 82.93% and a specificity of 75.58%. There was only a minor difference in the area under the curve (AUC) value of the receiver operating characteristic curve (ROC) curve between the Rotterdam CT score (0.827) and the Marshall classification system (0.833). The Rotterdam and Marshall CT scores have demonstrated significant independent prognostic value and may serve as a useful initial evaluation tool for risk stratification of in-hospital mortality among patients with TBI. Following table shows the differences between the studies.

FINDINGS	CURRENT STUDY	BRIJESH GOSWAMI ET AL 2023
N	**127**	127
MALES	**82**	85.8
FEMALES	**18**	14.2
MORTALITY RATE	**29**	32.3
MARSHALL SENSITIVITY	**74.79**	82.9
MARSHALL SPECIFICITY	**72**	75.58
ROTTERDAM SENSITIVITY	**89.13**	60.98
ROTTERDAM SPECIFICITY	**77.14**	90.70
AUC MARSHALL	**0.748**	0.827
AUC ROTTERDAM	**0.892**	0.833

TABLE 20

CONCLUSION

CONCLUSION

In our study , the accuracy of the Marshall scoring system is slightly higher than that of the Rotterdam scoring system. The sensitivity and specificity of the Rotterdam scoring system were higher than the Marshalls scoring system. The PPV of Marshalls is higher than the Rotterdam scoring system. NPV of the Rotterdam is higher than the Marshall scoring system. The P Value of Rotterdam is 0.0004, which is more significant when compared to the P value of Marshalls, which is 0.001, indicating more correlation with Rotterdam. Marshall scoring system correlation with GOSE score (P - 0.001,0.002)was more predictive and consistent with patients prognosis and recovery when compared to Rotterdam scoring system (0.004 and 0.004).

Our study concludes that Rotterdam scoring is superior in predicting the outcome, and the Marshall scoring system has more predictions for the prognosis of the patient and recovery.

As mentioned in the discussion, few studies show no significant difference; few show Rotterdam's superiority and few support Marshall scoring system.

Though Rotterdam has higher sensitivity and specificity, both scoring systems have a strong correlation on both outcome and prognosis.

Hence, this study would suggest both scoring systems as the indicators of early outcome and Rotterdam for higher sensitivity and specificity.

STUDY LIMITATIONS

Some limits of the study need discussion. Even with many patients, the study was done at one center only, which might limit how findings apply to other places. Still, this study adds important knowledge to the existing literature, making it necessary for other researchers and centers worldwide to look into how accurate and effective CT classification models are for trauma patients, aiding in their external validation.

Also, there is a limit to not having data on how the studied population did in the long run, so it is recommended that future authors check the Glasgow Outcome Scale as a measure. Nonetheless, the challenge of long-term follow-up for TBI patients is not just in this study and has been noted in other research.

LIST OF TABLES

TABLE NUMBER	CONTENT
1	TABLE SHOWING DEMOGRAPHIC CHARACTERISTICS OF STUDY POPULATION
2	FREQUENCY OF SURVIVAL AND DEATH IN STUDY POPULATION
3	TABLE SHOWING AGE CHARACTERISTICS
4	TABLE SHOWING MALE AND FEMALE FREQUENCY
5	TABLE SHOWING DEMOGRAPHIC CHARACTERISTICS AND VARIATIONS IN SURVIVED AND EXPIRED PATIENTS
6	TABLE SHOWING AVERAGE OF MARSHALL SCORING SYSTEM AND STANDARD DEVIATION
7	TABLE SHOWING AVERAGE OF ROTTERDAM SCORING SYSTEM AND STANDARD DEVIATION
8	TABLE SHOWING OUTCOME RELATION OF SCORING SYSTEMS
9	TABLE SHOWING CORRELATION OF ROTTERDAM SCORING SYSTEM WITH MARSHALL SCORING SYSTEM
10	TABLE SHOWING RESULTS OF AUC, SENSITIVITY , SPECIFICITY , PPV , NPV , P VALUE, ACCURACIES OF MARSHALL SCORING SYSTEM
11	TABLE SHOWING RESULTS OF AUC, SENSITIVITY , SPECIFICITY , PPV , NPV , P VALUE, ACCURACIES OF ROTTERDAM SCORING SYSTEM
12	TABLE SHOWING GOSE SCORE CORRELATION WITH BOTH SCORING SYSTEMS
13	COMPARISON OF CURRENT STUDY WITH DEEPIKA ET AL STUDY
14	COMPARISON OF CURRENT STUDY WITH MUNAKOMI ET AL STUDY
15	COMPARISON OF CURRENT STUDY WITH PARGONKAR ET AL STUDY
16	COMPARISON OF CURRENT STUDY WITH AMP SIAHAAN ET AL STUDY
17	COMPARISON OF CURRENT STUDY WITH MOHAMMADI FARD ET AL STUDY
18	COMPARISON OF CURRENT STUDY WITH RANJEET KUMAR JHA ET AL STUDY
19	COMPARISON OF CURRENT STUDY WITH RICARDEZ-LG ET AL STUDY
20	COMPARISON OF CURRENT STUDY WITH BRIJESH GOSWAMI ET AL STUDY

LIST OF BAR GRAPHS,PIE CHARTS, ROC CURVES, SCATTER PLOTS

TABLE NUMBER	CONTENT
1	BAR GRAPHS SHOWING MARHSALL AND ROTTERDAM SCORING SYSTEMS IN SURVIVED AND DEATH PATIENTS
2	BAR GRAPH SHOWING AVERAGE SCORES OF BOTH SCORING SYSTEMS
3	BAR GRAPH SHOWING AVERAGE GOSE SCORE DURING FOLLOW UP AT 3 MONTHS AND 6 MONTHS
4	BAR GRAPH SHOWING MARSHALL SCORING SYSTEM MEAN AVERAGE
5	BAR GRAPH SHOWING ROTTERDAM SCORING SYSTEM MEAN AVERAGE
6	PIE CHART 1 MARSHAL SCORING SYSTEM FREQUENCY
7	PIE CHART 2 ROTTERDAM SCORING SYSTEM FREQUENCY
8	MARSHALL SCORING SYSTEM SENSITIVITY AND SPECIFICITY ROC CURVE 1
9	ROTTERDAM SCORING SYSTEM SENSITIVITY AND SPECIFICITY ROC CURVE 2
10	SCATTER PLOT 1 SHOWING MARSHALL SCORING SYSTEM AND ITS OUTCOME
11	SCATTER PLOT 2 SHOWING ROTTERDAM SCORING SYSTEM AND ITS OUTCOME
12	SCATTER PLOT 3 SHOWING MARSHALL SCORING SYSTEM AND CORRELATION WITH GOSE SCORE AT 3 MONTHS
13	SCATTER PLOT 4 SHOWING ROTTERDAM SCORING SYSTEM AND CORRELATION WITH GOSE SCORE AT 3 MONTHS
14	SCATTER PLOT 5 SHOWING ROTTERDAM SCORING SYSTEM AND CORRELATION WITH GOSE SCORE AT 6 MONTHS
15	SCATTER PLOT 6 SHOWING MARSHALLS SCORING SYSTEM AND CORRELATION WITH GOSE SCORE AT 6 MONTHS

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ANNEXURE I: PARTICIPANT INFORMATION SHEET

PATIENT INFORMATION SHEET

Full title of the study:

A COMPARATIVE STUDY BETWEEN MARSHALL AND ROTTERDAM CT SCORES IN PREDICTING EARLY OUTCOME IN PATIENTS OF TRAUMATIC BRAIN INJURY

You are invited to participate in a clinical study. Before agreeing to participate in this study it is important that you read and understand why the research is being done and what will happen during it. Please take time to read this information carefully.

Take time to ask as many questions as you want. The study personnel will explain any word or information you do not clearly understand. You may to talk to others about the study if you wish.

Part 1 tells you the purpose of the research and explains what will happen if you take part in it.

Part 2 gives you more information about the conduct of the study if you are still interested after reading Part 1.

Question 1 : What is the purpose of the study?

Predicting outcome following TBI is the Hillary point in our quest to planning and managing our resources in patients with TBI. It bears paramount impact on the economy of developing countries.For prognostication to be clinically relevant, outcomes must provide a mirror impression of future life. In the future, it will be important to develop study models that will incorporate not just the imaging characteristics but also include the clinical parameters that play pivotal role in predicting outcome following TBI. Both imaging score (Marshall) and clinical score (Rotterdam) can be used to reliably predict mortality in patients with acute traumatic brain injury with high

prognostic accuracy. Recently, many studies were conducted to evaluate the comparative efficacy of the two prediction models. Each of these models aims at improving the outcome prediction and has their own sets of limitations. Since guidelines for surgery in TBI patients is not uniform worldwide, two major limitations of Marshall scoring is stated as the division of hematoma based on volume and surgical evacuation. Additionally, there is existing literature in favor of either of the scoring system and there is no conclusive evidence as to which scoring systems has better predictive power.

Therefore, this comparative study aims to compare the both studies and update the available evidence from existing studies of the predictive value of Marshall and Rotterdam CT scoring system in predicting clinical outcome in TBI patients.

Question 2 : Why have I been chosen?

You have been approached because you fulfil the entry criteria for the study.
Inclusion criteria for this include-
Patients older than 18 years of age with recent head blunt trauma (e.g., fall, driving accidents or others) within the last 24 hours, and GCS ≤13 with abnormal CT scan.

Question 3: Do I have to take part?
It is up to you to decide whether or not to take part. If you do, you will be given this information sheet to keep and be asked to sign a consent form. You are still free to withdraw consent from the study at any time and without giving a reason. A decision to withdraw at any time, or a decision not to take part, will not affect the standard of care you receive.

Question 4: What will happen to me if I take part?

The doctors will do proper examination as usual and will be treated on regular basis .There will be

no change in the standard of treatment.All emergency procedures were performed by emergency specialists and neurosurgeons on duty based on scientific indications. Initial CT and status at hospital discharge (dead or alive) were reviewed, and both CT scores were calculated. We will examine whether each score is related to early death; compare the two scoring systems performance in predicting early death, and identify the CT findings that are independent predictors for early death.

Question 5: Expenses and payments :
Joining the trial will not result in any expenses for you. None of the participants will receive any payment.

Question 6: What do I have to do?
Once you have consented to join the trial, you will be asked to give relevant information and share your CT Scan reports for the research study.

Question 7: What are the other possible disadvantages and risks of taking part?
We are not aware of any disadvantages or risks of joining our study.

Question 8: What are the possible benefits of taking part?
This study involves both the scoring systems which is helpful to determine the prognosis of the patient and predict the mortality and treat the patient accordingly.

Question 9: Will my taking part in the study be kept confidential?
Yes. The information about you will only be known to members of the research team. All information about you will be held using a unique research number so that you cannot be identified in any results, publications or publicity related to the study.

Part 2

Question 10: What if relevant new information becomes available?

Sometimes during the course of a study, new information becomes available about the intervention being studied. If this happens, the doctor will tell you about it and discuss whether or not you wish to continue in the study. If you wish to withdraw from the study, the study doctor will make arrangements for your continued care. If you decide to continue in the study, you may be asked to sign an updated consent form containing the new information. Both the researchers and an independent committee of experts will be looking-out for any new information. If the study is stopped for any reason you will be told why and your continuing care and treatment will be arranged without any disturbance.

Question 11: What will happen if I don't want to carry on with the study?
You are free to withdraw consent from the study without giving a reason at any time. This will not affect the medical care that you receive in any way.

Question 12: What if there is a problem?
Complaints: If you have a concern about any aspect of this study, you should ask to speak with the researchers who will do their best to answer your questions.

Question 13: Will my taking part in the study be kept confidential?
Yes. The information about you will only be known to members of the research team. No individuals will be identified in any results, publications or publicity related to the study.
We will ask your permission to inform your doctor about your participation in the study.

Question 14: What will happen to any samples given?
Blood tests are done to check the bio chemical parameters. Samples will be sent to Diagnostic labs.

Question 15: What will happen to the results of the research study?

We may publish the findings of the study in the medical literature. You will not be identified in any reports or publications.

Thank you for taking the time to read this patient information sheet.

रोगी सूचना पत्र

अध्ययन का पूरा शीर्षक:

दर्दनाक मस्तिष्क चोट के रोगियों में प्रारंभिक परिणाम की भविष्यवाणी करने में मार्शल और रॉटरडैम सीटी स्कोर के बीच एक तुलनात्मक अध्ययन

आपको नैदानिक अध्ययन में भाग लेने के लिए आमंत्रित किया जाता है। इस अध्ययन में भाग लेने के लिए सहमत होने से पहले यह महत्वपूर्ण है कि आप पढ़ लें और समझें कि शोध क्यों किया जा रहा है और इसके दौरान क्या होगा। कृपया समय निकालकर इस जानकारी को ध्यान से पढ़ें।

जितने चाहें उतने प्रश्न पूछने के लिए समय निकालें। अध्ययन कर्मी ऐसे किसी भी शब्द या जानकारी की व्याख्या करेंगे जिसे आप स्पष्ट रूप से नहीं समझते हैं। आप चाहें तो अध्ययन के बारे में दूसरों से बात कर सकते हैं।

भाग 1 आपको शोध का उद्देश्य बताता है और बताता है कि यदि आप इसमें भाग लेते हैं तो क्या होगा।

भाग 2 आपको अध्ययन के संचालन के बारे में अधिक जानकारी देता है यदि आप इसके बाद भी रुचि रखते हैं
भाग 1 पढ़ना।

प्रश्न 1 : अध्ययन का उद्देश्य क्या है?
TBI के बाद परिणामों की भविष्यवाणी करना TBI के रोगियों में हमारे संसाधनों की योजना बनाने और उनके प्रबंधन की हमारी खोज में हिलेरी बिंदु है। यह विकासशील देशों की अर्थव्यवस्था पर सर्वोपरि प्रभाव डालता है।

भविष्यवाणियों के चिकित्सकीय रूप से प्रासंगिक होने के लिए, परिणामों को भविष्य के जीवन का दर्पण प्रभाव प्रदान करना चाहिए। भविष्य में, अध्ययन मॉडल विकसित करना महत्वपूर्ण होगा जो न केवल इमेजिंग विशेषताओं को शामिल करेगा बल्कि नैदानिक पैरामीटर भी शामिल करेगा जो टीबीआई के बाद परिणाम की भविष्यवाणी करने में महत्वपूर्ण भूमिका निभाते हैं। इमेजिंग स्कोर (मार्शल) और क्लिनिकल स्कोर (रॉटरडैम) दोनों का उपयोग उच्च भविष्यसूचक सटीकता के साथ तीव्र अभिघातजन्य मस्तिष्क की चोट वाले रोगियों में मृत्यु दर का मज़बूती से अनुमान लगाने के लिए किया जा सकता है। हाल ही में, दो भविष्यवाणी मॉडल की तुलनात्मक प्रभावकारिता का मूल्यांकन करने के लिए कई अध्ययन किए गए। इन मॉडलों में से प्रत्येक का लक्ष्य परिणाम की भविष्यवाणी में सुधार करना है और इसकी अपनी सीमाएं हैं। चूंकि टीबीआई रोगियों में सर्जरी के लिए दिशानिर्देश दुनिया भर में एक समान नहीं हैं, इसलिए मार्शल स्कोरिंग की दो प्रमुख सीमाओं को वॉल्यूम और सर्जिकल निकासी के आधार पर हेमेटोमा के विभाजन के रूप में बताया गया है। इसके अतिरिक्त, स्कोरिंग सिस्टम में से किसी के पक्ष में मौजूदा साहित्य है और कोई निर्णायक सबूत नहीं है कि किस स्कोरिंग सिस्टम में बेहतर भविष्य कहनेवाला शक्ति है।
इसलिए, इस तुलनात्मक अध्ययन का उद्देश्य दोनों अध्ययनों की तुलना करना और टीबीआई रोगियों में नैदानिक परिणाम की भविष्यवाणी करने में मार्शल और रॉटरडैम सीटी स्कोरिंग प्रणाली के पूर्वानुमानित मूल्य के मौजूदा अध्ययनों से उपलब्ध साक्ष्य को अद्यतन करना है।

प्रश्न 2 : मुझे क्यों चुना गया है?

आपसे संपर्क किया गया है क्योंकि आप अध्ययन के लिए प्रवेश मानदंड को पूरा करते हैं।
इसके लिए समावेशन मानदंड में शामिल हैं-
पिछले 24 घंटों के भीतर हाल ही में सिर कुंद आघात (जैसे, गिरना, ड्राइविंग दुर्घटनाएं या अन्य) के साथ 18 वर्ष से अधिक आयु के रोगी और असामान्य सीटी स्कैन के साथ जीसीएस ≤13।

प्रश्न 3: क्या मुझे भाग लेना है?
यह आपको तय करना है कि भाग लेना है या नहीं। यदि आप करते हैं, तो आपको यह सूचना पत्र रखने के लिए दिया जाएगा और सहमति फॉर्म पर हस्ताक्षर करने के लिए कहा जाएगा। आप अभी भी किसी भी समय और बिना कोई

कारण बताए अध्ययन से सहमति वापस लेने के लिए स्वतंत्र हैं। किसी भी समय वापस लेने का निर्णय, या भाग न लेने का निर्णय, आपको प्राप्त होने वाली देखभाल के स्तर को प्रभावित नहीं करेगा।

प्रश्न 4: यदि मैं भाग लेता हूँ तो मेरा क्या होगा?

डॉक्टर हमेशा की तरह उचित जांच करेंगे और नियमित आधार पर इलाज करेंगे। उपचार के मानक में कोई बदलाव नहीं होगा। सभी आपातकालीन प्रक्रियाएं आपातकालीन विशेषज्ञों और ड्यूटी पर मौजूद न्यूरोसर्जन द्वारा वैज्ञानिक संकेतों के आधार पर की गईं। प्रारंभिक सीटी और अस्पताल में छुट्टी (मृत या जीवित) की स्थिति की समीक्षा की गई, और दोनों सीटी स्कोर की गणना की गई। हम जांच करेंगे कि क्या प्रत्येक स्कोर प्रारंभिक मृत्यु से संबंधित है; प्रारंभिक मृत्यु की भविष्यवाणी करने में दो स्कोरिंग सिस्टम के प्रदर्शन की तुलना करें, और सीटी निष्कर्षों की पहचान करें जो प्रारंभिक मृत्यु के लिए स्वतंत्र भविष्यवक्ता हैं।

प्रश्न 5: व्यय और भुगतान :
परीक्षण में शामिल होने से आपके लिए कोई खर्च नहीं होगा। किसी भी प्रतिभागी को कोई भुगतान प्राप्त नहीं होगा।

प्रश्न 6: मुझे क्या करना होगा?
एक बार जब आप परीक्षण में शामिल होने के लिए सहमत हो जाते हैं, तो आपको प्रासंगिक जानकारी देने और शोध अध्ययन के लिए अपनी सीटी स्कैन रिपोर्ट साझा करने के लिए कहा जाएगा।

प्रश्न 7: भाग लेने के अन्य संभावित नुकसान और जोखिम क्या हैं?
हम अपने अध्ययन में शामिल होने के किसी भी नुकसान या जोखिम से अवगत नहीं हैं।

प्रश्न 8: भाग लेने के संभावित लाभ क्या हैं?
इस अध्ययन में दोनों स्कोरिंग प्रणालियां शामिल हैं जो रोगी के रोग का निदान निर्धारित करने और मृत्यु दर की भविष्यवाणी करने और तदनुसार रोगी का इलाज करने में सहायक हैं।

प्रश्न 9: क्या अध्ययन में मेरे भाग लेने को गोपनीय रखा जाएगा?

हाँ। आपके बारे में जानकारी केवल अनुसंधान दल के सदस्यों को ही पता होगी। आपके बारे में सभी जानकारी एक अद्वितीय शोध संख्या का उपयोग करके रखी जाएगी ताकि अध्ययन से संबंधित किसी भी परिणाम, प्रकाशन या प्रचार में आपकी पहचान न हो सके।

भाग 2

प्रश्न 10: यदि प्रासंगिक नई जानकारी उपलब्ध हो जाती है तो क्या होगा?

कभी-कभी किसी अध्ययन के दौरान, अध्ययन किए जा रहे हस्तक्षेप के बारे में नई जानकारी उपलब्ध हो जाती है। यदि ऐसा होता है, तो डॉक्टर आपको इसके बारे में बताएंगे और चर्चा करेंगे कि आप इस अध्ययन को जारी रखना चाहते हैं या नहीं। यदि आप अध्ययन से हटना चाहते हैं, तो अध्ययन डॉक्टर आपकी निरंतर देखभाल की व्यवस्था करेंगे। यदि आप अध्ययन जारी रखने का निर्णय लेते हैं, तो आपको नई जानकारी वाले एक अद्यतन सहमति फॉर्म पर हस्ताक्षर करने के लिए कहा जा सकता है। शोधकर्ता और विशेषज्ञों की एक स्वतंत्र समिति दोनों किसी भी नई जानकारी की तलाश में रहेंगे। यदि किसी भी कारण से अध्ययन बंद कर दिया जाता है तो आपको बताया जाएगा कि क्यों और बिना किसी बाधा के आपकी निरंतर देखभाल और उपचार की व्यवस्था की जाएगी।

प्रश्न 11: यदि मैं अध्ययन जारी नहीं रखना चाहता तो क्या होगा?

आप किसी भी समय बिना कोई कारण बताए अध्ययन से अपनी सहमति वापस लेने के लिए स्वतंत्र हैं। यह आपको किसी भी तरह से प्राप्त होने वाली चिकित्सा देखभाल को प्रभावित नहीं करेगा।

प्रश्न 12: यदि कोई समस्या हो तो क्या करें?

शिकायतें: यदि आप इस अध्ययन के किसी भी पहलू के बारे में चिंतित हैं, तो आपको उन शोधकर्ताओं से बात करने के लिए कहना चाहिए जो आपके सवालों का जवाब देने की पूरी कोशिश करेंगे।

प्रश्न 13: क्या अध्ययन में मेरे भाग लेने को गोपनीय रखा जाएगा?

हाँ। आपके बारे में जानकारी केवल अनुसंधान दल के सदस्यों को ही पता होगी। अध्ययन से संबंधित किसी भी परिणाम, प्रकाशन या प्रचार में किसी भी व्यक्ति की पहचान नहीं की जाएगी।

हम अध्ययन में आपकी भागीदारी के बारे में आपके डॉक्टर को सूचित करने के लिए आपकी अनुमति मांगेंगे।

प्रश्न 14: दिए गए किसी भी नमूने का क्या होगा?

जैव रासायनिक मापदंडों की जांच के लिए रक्त परीक्षण किया जाता है। सैंपल डायग्नोस्टिक लैब भेजे जाएंगे।

प्रश्न 15: शोध अध्ययन के परिणामों का क्या होगा?

हम चिकित्सा साहित्य में अध्ययन के निष्कर्षों को प्रकाशित कर सकते हैं। किसी भी रिपोर्ट या प्रकाशन में आपकी पहचान नहीं होगी।

इस रोगी सूचना पत्र को पढ़ने के लिए समय निकालने के लिए धन्यवाद।

ANNEXURE II -PARTICIPANT INFORMED CONSENT FORM:

A COMPARATIVE STUDY BETWEEN MARSHALL AND ROTTERDAM CT SCORES IN PREDICTING EARLY OUTCOME IN PATIENTS OF TRAUMATIC BRAIN INJURY

Name of the Participant:

Patient's Registration Number:UHID NUMBER-

Gender: M/F Age:

Date of Birth:

Name of the Principal Investigator: Dr Ranjith Kumar Chegondi

Name of the guide: Dr Sumit Raj

Name of the Institution: All India institute of medical sciences, Bhopal.

Documentation of the informed consent:

I, ----------(Name)----------, aged about -------Years, a resident of ---------- village of ---------- district, have been detailed about the procedure. I understood the purpose of the said research project. .I have the opportunity to ask the question and all my questions and doubts have been answered to my satisfaction. I hereby give my consent for clinical information, images and laboratory and diagnostic information related to me to be included in this study.I on my own will, agreed to participate in this study.I understand that my identity will not be revealed in any information released to third parties or published, unless as required under the law. I agree not to restrict the use of any data or results that arise from the study. I understood that I can withdraw from the study at any point of the time without assigning any reason. My withdrawal from the study will not affect my ongoing treatment.

I understand that the information collected about me from my participation in this research and sections of any medical notes may be looked at by responsible individuals from AIIMS Bhopal. I give permission for these individuals to have access to my records.

I agree to take part in the above study.

……

Signature / left thumb impression

---------- Signature of the witness/thumb print

I ----------(Name)----------, aged about ----------

Signature of the participant / Guardian Address : _____

_____

_____

Date:

Place:

प्रतिभागी सूचित सहमति प्रपत्र:

दर्दनाक मस्तिष्क चोट के रोगियों में प्रारंभिक परिणाम की भविष्यवाणी करने में मार्शल और रॉटरडैम सीटी स्कोर के बीच एक तुलनात्मक अध्ययन

प्रतिभागी का नाम:

रोगी की पंजीकरण संख्या: UHID संख्या-

लिंग: एम / एफ आयु:

जन्म की तारीख:

प्रधान अन्वेषक का नाम: डॉ रंजीत कुमार चेगोंडी

गाइड का नाम: डॉ सुमित राज

संस्थान का नाम: अखिल भारतीय आयुर्विज्ञान संस्थान, भोपाल।

सूचित सहमति का दस्तावेज़ीकरण:
मैं, ----------(नाम)----------, आयु लगभग ------- वर्ष, निवासी ---- ---------- गांव ---------- - जिला, प्रक्रिया के बारे में विस्तार से बता दिया गया है। मैं उक्त शोध परियोजना के उद्देश्य को समझ गया। मेरे पास प्रश्न पूछने का अवसर है और मेरे सभी प्रश्नों और शंकाओं का मेरी संतुष्टि के अनुसार उत्तर दिया गया है। मैं इस अध्ययन में शामिल होने के लिए नैदानिक जानकारी, छवियों और प्रयोगशाला और नैदानिक जानकारी के लिए अपनी सहमति देता हूं। मैं अपनी मर्जी से इस अध्ययन में भाग लेने के लिए सहमत हूं। मैं समझता हूं कि मेरी पहचान किसी भी जानकारी में प्रकट नहीं की जाएगी। तीसरे पक्ष को जारी या प्रकाशित, जब तक कि कानून के तहत आवश्यक न हो। मैं अध्ययन से उत्पन्न होने वाले किसी भी डेटा या परिणाम के

उपयोग को प्रतिबंधित नहीं करने के लिए सहमत हूं। मैं समझ गया था कि मैं बिना कोई कारण बताए किसी भी समय अध्ययन से पीछे हट सकता हूँ। अध्ययन से मेरी वापसी मेरे चल रहे उपचार को प्रभावित नहीं करेगी।

मैं समझता हूं कि इस शोध में मेरी भागीदारी से मेरे बारे में एकत्र की गई जानकारी और किसी भी मेडिकल नोट के अनुभागों को एम्स भोपाल के जिम्मेदार व्यक्तियों द्वारा देखा जा सकता है। मैं इन व्यक्तियों को मेरे रिकॉर्ड तक पहुंच की अनुमति देता हूं।

मैं उपरोक्त अध्ययन में भाग लेने के लिए सहमत हूं।

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हस्ताक्षर/बाएं अंगूठे का निशान

---------- गवाह के हस्ताक्षर/अंगूठे का निशान

मैं----------(नाम)----------, आयु लगभग ---------- ----------

प्रतिभागी के हस्ताक्षर / अभिभावक का पता : _____

_____

_____

तारीख:

स्थान:

ANNEXURE III : STRUCTURED QUESTIONNAIRE

1. IDENTIFYING INFORMATION

1.1.Name of Patient

1.2.Father's name

1.3.Age/Sex:

1.4.UHID Registration Number:

1.5.Date of Registration:

1.6.Place of Residence:

1.7.Phone/ Mobile

1.8. Date of injury:

1.9 Time of injury:

1.10 Place of injury:

1.11 Mode of injury:

1.12 Site of injury:

1.13 Informant and relationship with patient:

1.14 MLC registration:

2. DETAILS OF SYMPTOMS

Primary survey: According to ATLS protocol,check for , and manage accordingly:

Airway

Breathing

Circulation

Disability

Exposure(head to toe)

Secondary survey: After primary stabilisation of the patient,will check for the following symptoms:

2.1. Sensorium

2.2. Weakness of extremities

2.3. Sensory deficits

2.4. Bladder bowel functional loss

2.5. Sites and types of injuries(if any): Bruise/Abrasions/Lacerations/ Cut injuries/Degloving injuries

2.6. Sites of pain:

2.7. Facial/ bony deformities(if any):

2.8. Abdominal or chest trauma:

2.9. Other symptoms:

3. DETAILS OF EXAMINATION

A.3.1. General survey:

Higher mental function

Head to toe examination: pallor/icterus/cyanosis/clubbing/edema/lymphadenopathy

Vitals: pulse/BP/JVP/ Temperature/Respiratory rate

Systemic examination: CVS/RS/Abdomen

B. CNS examination

3.2. Cranial nerve functions

3.4. Motor function: Nutrition

Tone

Power

Coordination

Involuntary movements

3.5. Sensory function: Pain

Touch

Temperature

Posterior column sensation

Two point discrimination

Stereognosis

Graphaesthesia

3.6. Superficial reflexes: Abdominal

Cremasteric

Plantar

3.7. Deep tendon jerks: Biceps jerk

Triceps jerk

Supinator jerk

Hoffman reflex

Knee jerk

Ankle jerk

3.8. Cerebellar functions:

INVESTIGATIONS

4.1. Routine investigations:

4.1.1. Hemoglobin:

4.1.2. Total leukocyte Count:

4.1.3. Platelet Count:

4.1.4. Serum sodium and potassium:

4.1.5. Urea & Creatinine:

4.1.6. Liver function test:

4.1.7. Prothrombin time and INR:

4.1.8. Viral serology:

4.1.9. Others (as per clinical indication):

4.2.NCCT HEAD

Scoring systems based on CT findings.

5.1. Marshall CT scoring system and predictive value

5.2 . Rotterdam CT scoring system and prognostic value

5.3 Follow up and outcome

5.4 Prediction of Marshall CT scoring system

5.5 Prediction of Rotterdam scoring system

5.6 At Discharge GCS-

5.7 GOSE score at 3 month

5.8 GOSE score at 6 months

MASTER CHART- MARSHALL AND ROTTERDAM CT SCORES IN PREDICTING EARLY OUTCOME IN PATIENTS OF TRAUMATIC BRAIN INJURY

Name	Age	UHID Registration number	Date of injury	Mode of injury	Site of injury	NCCT Head	GCS	Marshall scoring system- DIFFUSE	Marshall scoring system prediction	Rotterdam scoring system	Rotterdam scoring system	GCS(at the time of discharge)	Followup at 3 months- GOSE SCORE	Followup at 6 months -GOSE SCORE
BHAVNA	42/F	239212301440161	29.06.2023	RTA bike vs bike	Head	Polytrauma with DAI	E3V1M4	3	39.5	4	26	E4VTM5	7	8
MAKHAN SINGH	33/M	239212301454715	30.06.2023	RTA bike vs bike	Head	Right temporal contusion and left temporal EDH	E2V2M5	2	25	2	7	E4V5M6	7	8
VIRENDRA	47/F	239212202493911	27.06.2023	Fall from height	Head	Left frontal depressed fracture and left base frontal contusion	E1V1V5	4	48.1	5	53	EXPIRED	1	1
OMVATI YADAV	22/F	239212301407750	25.06.2023	RTA bike vs bike	Head	Left parieto temporal SDH	E3V2M5	5	71.4	5	53	E4V5M6	3	4
NATTU YADAV	62/M	239212301410084	26.06.2023	RTA bike fall	Head	Hemorrhagic changes	E2V2M5	3	39.5	4	26	E4V5M6	6	7
JAMNA PRASAD	61/M	239212301460031	02.07.2023	RTA bike vs bike	Head	B/l basifrontal contusion	E1V1M1	6	76	6	61	EXPIRED	1	1
SUMAN BAI	55/F	239212301461495	02.07.2023	RTA bike fall	Head	Bifrontal contusions, Right temporal contusions , occipital fracture	E1VTM3	5	71.4	6	61	EXPIRED	1	1
DIPAK VATKE	27/F	239212301481488	05.07.2023	RTA bike vs bike	Head	Small right FTP SDH and DAI	E4VTM4	3	39.5	4	26	E4VTM4	4	6
SAPNA	19/F	239212301514785	12.07.2023	RTA bike fall	Head	Left frontal EDH	E2V2M5	2	25	2	7	E4V5M6	7	8
PYARE LAL	38/F	239212023024410	13.07.2023	RTA bike vs bike	Head	Left frontotemporal SDH and left temporal contusion	E2V1M5	5	71.4	6	61	E4V5M6	8	8
UMASHANKER	35/M	239212301559401	13.07.2023	RTA bike fall	Head	Left frontal EDH	E2V2M5	5	71.4	3	16	E4V5M6	7	
SATISH VISHVKARMA	24/M	239212301572947	14.07.2023	RTA bike vs bike	Head	B/L frontal contusions with Linear depressed fracture of left temporal parital bone	E3V3M5	2	25	2	7	E3V4M5	1	8
BHAGIRATH	26/M	239212301563531	15.07.2023	RTA bike fall	Head	Biparietal contusions	E4V1M5	2	25	2	7	E4VTM5	5	7
ABHISHEK	21/M	239212301628799	20.07.2023	RTA bike fall	Head	Right parieto occipital SDH	E1VTM2	5	71.4	6	61	EXPIRED	1	1
PREM SINGH	42/M	239212301641141	21.07.2023	Fall from height	Head	Right ftp, acute SDH	E4VTM5	5	71.4	5	53	E4VTM5	1	1
RAJU	51/M	239212301642864	22.07.2023	Fall from bike	Head	Left frontotemporal Contusion and right temporal Pareto linear fracture	E4V4M5	5	71.4	3	16	E4V1M5	7	8
MANISHA BANSHKAR	23/F	239212301693931	27.07.2023	Collision with cow	Head	Left frontal EDH with linear undisplayed fracture along left coronal suture and right zygomatic arch fracture	E4V4M5	5	71.4	5	53	E4V1M5	3	4
POONAM SINGH	23/M	239212301704134	28.07.2023	RTA bike fall	Head	Right parietal EDH	E2V2M4	5	71.4	4	26	E4V4M6	7	8
TAJUDDIN SHAKH	30/M	239212301724953	31.07.2023	RTA bike vs bike	Head	Bifrontal contusions	E3V4M5	2	25	2	7	E4V5M6	5	6
MUNNA KUSHWAHA	27/M	239212301750331	02.08.2023	RTA bike fall	Head	Multiple hemorrhagic contusions	E3V2M5	3	39.5	3	16	E4V5M6	1	1
RAJARAM	62/M	239212301791941	07.08.2023	RTA bike fall	Head	SDH along fall and tentorium	E3V3M5	2	25	2	7	E4V5M6	6	7
DEEPANSHU	29/M	239212301792602	07.08.2023	RTA bike fall	Head	Right front temporal SAH,	E4V3M5	2	25	2	7	E4V5M6	8	8
LAL SINGH	50/M	239212301832337	10.08.2023	RTA bike vs bike	Head	Right basi frontal contusions	E2V2M5	2	25	2	7	E4V5M6	6	7
UMESH	35/M	239212301830814	10.08.2023	RTA bike vs bike	Head	Right temporal contusions	E4VTM5	5	71.4	4	26	E4VTM5	7	8
GIRISH	25/M	239212301863313	12.08.2023	RTA bike vs bike	Head	Left parietal depressed fracture with DAI	E1V2M5	5	71.4	5	53	E4VTM5	5	6
MOTI LAL	55/M	239212301864026	13.08.2023	RTA bike fall	Head	Left parieto temporal contusion	E4V4M4	3	39.5	3	26	E4V5M6	7	8
MAKHAN SINGH	32/F	239212301867661	14.08.2023	Fall from height	Head	Left parietal EDH	E3V2M5	5	71.4	3	16	E4V5M6	7	8
ANKIT BHADE	25/M	239212301899008	17.08.2023	RTA bike vs car	Head	Right parietotemporal SDH	E4V2M5	3	39.5	4	26	E4V5M6	7	8
ASHOK SAHU	28/M	239212301934407	20.08.2023	RTA bike fall	Head	FTP EDH	E1V2M5	5	71.4	4	26	E4V5M6	7	8
ROSHAN SHAH	26/M	239212301975421	24.08.2023	RTA bike fall	Head	Right parietotemporal SDH, contusions	E3V2M5	3	39.5	3	16	E4V5M6	7	8
RASHIMI SHARMA	25/F	239212302005574	26.08.2023	RTA bike fall	Head	left parietotemporal SDH	E3V4M5	3	39.5	3	26	E4V5M6	7	8
NAND KISHOR	50/M	239212302011124	27.08.2023	RTA bike fall	Head	Right FTP with acute SDH	E2V3M5	5	71.4	5	53	EXPIRED	1	1
DEVENDRA	23/M	239212023031484	28.08.2023	RTA bike fall	Head	Left temporal contusion	E3V2M4	5	71.4	3	16	E4VTM5	7	8
SANTOSH	27/M	239212302022967	29.08.2023	RTA bike fall	Head	Left FTP SDH	E1V4M5	2	25	3	16	E4V5M6	7	8
ADARSH CHOUHAN	22/M	239212023031871	30.08.2023	RTA bike fall	Head	Right FTP with acute SDH	E1V1M2	5	71.4	4	26	E4VTM2	4	5
NAND RAM	38/M	239212302038626	31.08.2023	RTA bike vs car	Head	Left parieto temporal contusion	E1V1M3	5	71.4	3	16	E4V5M6	6	7
MADHU BUNKAR	24/F	239212302046912	31.08.2023	RTA bike fall	Head	Left temporal contusion	E2V2M5	2	25	3	26	E4V5M6	7	8
ARAVIND PARTE	35/M	239212301999452	25.08.2023	RTA bike vs truck	Head	Right frontotemporo occipital contusion, frontal bone fracture	E2V2M5	5	71.4	6	61	EXPIRED	1	1

							fracture							
41	RAKESH NAMDEV	48/M	239212301668928	25.08.2023	RTA bike fall	Head	Right GC hemorrhagic contusion	E2VTM5	5	71.4	6	61	EXPIRED	1
42	BHARAT SINGH	26/M	239212302056349	06.08.2023	RTA bike fall	Head	DAI	E2V2M5	2	25	2	7	E4V5M6	3
43	VEERENDRA AHIRWAR	27/M	239212302056993	01.09.2023	RTA	Head	Right temporal contusion	E3V3M5	5	71.4	3	16	E4V5M6	7
44	RAM	15/M	239212302130620	09.09.2023	RTA	Head	Left tensorial SDH, Right occipital depressed fracture, right temporal contusion	E1VTM2	3	39.5	3	16	E2VTM5	7
45	PRAMOL SINGH RAJPUT	40/M	239212302177006	12.09.2023	RTA bike fall	Head	Right temporal contusion	E3V2M5	2	25	2	7	E4V5M6	7
46	DHARAMDAS ADIWASHI	24/M	239212302177359	13.09.2023	RTA	Head	Left fronto temporal EDH	E3V4M5	3	39.5	2	7	E4V5M6	8
47	KARAN KADARE	26/M	239212302190282	13.09.2023	RTA	Head	Left temporal EDH with Contusion	E1V1M4	5	71.4	5	53	E4VTM5	1
48	AJAY CHADAR	32/M	239212302213649	15.09.2023	RTA bike fall	Head	DAI with mandible fracture and D7 burst fracture	E3V1M4	2	25	3	16	E3VTM5	
49	NARENDRA PAWAR	30/M	239212302221617	16.09.2023	RTA bike fall	Head	Traumatic diffuse axonal injury	E1V1M2	2	25	3	16	E2VTM5	5
50	RAMESH KUMAR KARMEE	60/M	239212302223911	17.09.2023	RTA bike fall	Head	Acute SDH with mass effect	E1V1M1	6	76	5	53	EXPIRED	1
51	KAVINDRA DHAKAD	21/M	239212302236771	19.09.2023	RTA bike fall	Head	TBI with bifrontal contusion and falcine SDH	E2V2M5	3	39.5	3	16	E4V5M6	8
52	ROHIT	18/M	239212302291577	24.09.2023	RTA bike fall	Head	Diffuse Axonal injury	E1V1M5	2	25	3	16	E4V3M5	8
53	KAILESH	20/M	239212302290911	24.09.2023	RTA bike fall	Head	TBI with DAI grade1	E2V2M5	3	39.5	3	16	E4V1M5	6
54	KARAN	22/M	239212302292018	24.09.2023	RTA bike fall	Head	TBI with DAI Grade3 , left BG contusion	E1V1M4	3	39.5	3	16	E4V1M6	3
55	SHIVAY VISHWAKARMA	20/M	239212302292271	25.09.2023	RTA bike fall	Head	Right lateral ventricle and 4 th ventricle IVH with Right parietal fracture with depressed fracture segment and diffuse cerebral edema	E2V2M5	3	39.5	3	16	EXPIRED	1
56	ATAR SINGH CHAMR	61/M	239212302304440	25.09.2023	RTA bike fall	Head	Traumatic Bifrontal Contusions	E4V4M5	3	39.5	3	16	E4V5M6	7
57	VISHAL SONWANE	22/M	239212302335337	28.09.2023	RTA bike fall	Head	Hemorrhagic temporal contusion	E1VTM1	5	71.4	5	61	EXPIRED	1
58	VIJAY KHANDVE	26/M	239212302319439	26.09.2023	RTA bike vs car	Head	B/L EDH	E1VTM4	5	71.4	5	61	EXPIRED	1
59	DEEPAK	48/M	239212302272041	22.09.2023	RTA bike fall	Head	B/l Basifrontal contusion , FTP SAH	E4V4M5	2	25	3	16	E4V4M5	1
60	CHOTU THAKUR	15/M	239212302360242	01.10.2023	RTA bike fall	Head	Diffuse injury with periventricular and corpus callous contusions	E2V2M5	2	25	3	16	E3V5M6	7
61	LAKHAN SINGH	50/M	239212302364086	02.10.2023	RTA bike fall	Head	Left FTP SDH with ME MLS	E1V1M1	5	71.4	4	26	E4VTM5	6
62	SHRIRAM DEHARIYA	68/M	239212302381886	3.10.2023	RTA bike fall	Head	Large SDH with Mass effect , midline shift	E1VTM1	6	76	4	26	EXPIRED	1
63	UMA SHANKAR ROLASIYA	42/M	239212302396034	4.10.2023	RTA	Head	Traumatic right front temporal SAH and contusion	E2V2M5	2	25	2	7	E4V5M6	7
64	RAMAVTAR SINGH DANGI	33/M	239212302419557	6.10.2023	RTA	Head	TBI with Right occipital EDH + Right FTP SDH + Left temporal contusion	E1VTM2	5	71.4	4	26	EXPIRED	1
65	BASANTI RAI	39/F	239212302419956	6.10.2023	RTA	Head	Left parieto temporal contusion	E3V4M5	2	25	3	16	E4V5M6	8
66	SAROJ BAI KORI	48/F	239212302425794	7.10.2023	RTA bike fall	Head	LEFT FTP SDH with frontal contusion diffuse edema oedema with brain stem infarct, bleed	E1VTM1	6	76	5	53	EXPIRED	1
67	RAM LAL KUSHWAHA	44/F	239212302433088	9.10.2023	RTA bike fall	Head	Left frontal EDH	E2V2M5	5	71.4	4	26	E3V4M6	7
68	MUKESH	40/M	239212302445582	9.10.2023	RTA bike fall	Head	B/L cerebral contusions	E4V1M5	3	39.5	3	16	E4VTM5	3
69	MAHESH	62/M	239212302447844	9.10.2023	RTA bike fall	Head	Left FTP SDH	E4V5M6	3	39.5	4	26	E4V5M6	6
70	MADHU BIHARE	45/M	239212302462282	11.10.2023	RTA bike fall	Head	Right frontal EDH with temporal contusion	E3V1M5	3	39.5	4	26	E4V3M5	1
71	KAMRAN	13/M	239212302485541	12.10.2023	RTA bike fall	Head	DAI	E3V4M5	5	71.4	4	26	E4V5M6	7
72	ABHISHEK AHIRWAR	18/M	239212302497515	13.10.2023	RTA	Head	Right Parietal EDH with left frontotemporal with diffuse edema	E2V3M5	3	39.5	3	16	E4V4M6	7
73	MOHAN SINGH	35/M	239212302508738	15.10.2023	RTA bike fall	Head	DAI	E3V4M5	2	25	2	7	E4V5M6	8
74	SUNIL CHOUHAN	23/M	239212302558735	21.10.2023	RTA bike fall	Head	Multiple focal contusions b/l cerebral hemispheres and multiple craniomaxillofacial fractures	E2V2M4	3	39.5	3	16	E4V4M6	7
75	AJAY NAMDEV	16/M	239212302558727	21.10.2023	RTA bike fall	Head	B/L cerebral contusions with oedema	E2V2M5	3	39.5	4	26	EXPIRED	1
76	SHIMBHU SINGH	74/M	239212302565383	22.10.2023	RTA bike fall	Head	Bi frontal contusions + comminuted and displaced fracture	E1VTM3	5	71.4	5	53	EXPIRED	1
77	ASHISH DHOKE	32/M	239212302577071	24.10.2023	RTA bike fall	Head	SDH	E4V4M4	3	39.5	3	16	E4V4M6	8
78	PANMAL SINGH	24/M	239212302586101	25.10.2023	RTA bike fall	Head	Commented displaced fracture of occipital bone with hemorrhagic contusions with bifrontal frontal region	E1VTM1	6	76	5	53	EXPIRED	1
79	MANGAL MEENA	27/M	239212302596955	26.10.2023	RTA bike fall	Head	Right frontotemporal contusion with mass effect	E4V4M5	3	39.5	4	26	E4V5M6	7
80	RAMEHSWAR SEN	34/M	239212302597641	26.10.2023	RTA bike fall	Head	Right parieto SDH with left frontal and frontotemporal contusion	E3V2M5	3	39.5	3	16	E4V5M6	7

81	SHIVANI AHIRWAR	20/M	239212302614155	28.10.2023	RTA	Head	Left parieto temporal contusion	E3V2M5	2	25	3	16	E4V5M6	8	8
82	TEHRIM	7/F	239212302634849	31.10.2023	RTA bike fall	Head	Traumatic right frontal bone fracture with contusion, SDH and diffuse axonal injury	E1V2M5	5	71.4	4	26	EXPIRED	1	1
83	SHER SINGH	47/M	239212302661641	01.11.2023	Fall from bike	Head	Multiple tiny contusions	E3V3M5	3	39.5	3	16	E4V4M6	7	8
84	DULICHAND	56/M	239212302662249	03.11.2023	Self fall from bike	Head,	DAI	E2V1M4	2	25	2	7	E4VTM5	6	7
85	SADU	20/M	239212302663253	04.11.2023	RTA bike vs bike	Head	Rt FTP SDH	E1V2M2	5	71.4	4	26	EXPIRED	1	1
86	YOGENDRA	42/M	239212302883644	04.12.2023	RTA HIT by bus	Head	DAI with Right SDH	E1V1M2	4	48	5	53	EXPIRED	1	1
87	BALRAM	32/M	239212201055279	06.11.2023	Fall from bike	Head	Rt TP EDH , DAI	E3V2M5	5	71.4	2	7	E4V4M5	7	7
88	GOURAV	18/M	239212302689422	07.11.2023	Fall from bike	Head	DAI	E2V1M5	3	39.5	3	16	E4VTM5	7	7
89	RAM RAJ	25/M	239212302712319	12.11.2023	Fall from bike	Head	DAI	E1V1M5	3	37.5	3	16	E4V4M5	6	8
90	SHANKAR	35/M	239212302734363	15.11.2023	Fall from bike	Head	Left FTP SDH	E2V2M5	5	71.4	4	26	E4VTM5	6	8
91	SHANKARI BAI	45/F	239212302769523	20.11.2023	RTA	Head	Left acute SDH	E1V1M2	6	76	6	61	EXPIRED	1	1
92	SHAMEEM KHAN	43/M	239212023048515	22.11.2023	Fall from bike	Head	Right parietal EDH	E4V4M4	5	71.4	3	16	E4V5M6	7	8
93	PARUL SINGH	23/F	239212302800307	23.11.2023	RTA bike fall	Head	Right tentorial SDH	E4V4M6	2	25	3	16	E4V4M6	7	8
94	PARI KHARE	23/F	239212302810477	24.11.2023	Fall from stairs	Head	B/l basifrontal contusions	E3V4M5	5	71.4	3	16	E4V5M6	7	8
95	SURYABHAN	30/M	239212302860369	01.12.2023	Skid and fall	Head	Rt FTP SDH	E1V1M2	5	71.4	5	53	E2VtM3	3	5
96	RAM PATEL	20/M	239212302870097	03.12.2023	Fall from bike	Head	Lt temp contusion with SDH	E4V4M5	2	25	2	7	E4V5M6	7	8
97	ANIL MANJHI	24/M	239212302892597	05.12.2023	Fall from height	Head	Rt TP EDH	E1V1M2	5	71.4	5	53	EXPIRED	1	1
98	MANGILAL	60/M	239212302920876	08.12.2023	RTA bike vs bike	Head	Rt temp contusion	E4V4M5	2	25	2	7	E4V5M6	8	8
99	ROHIT NIGAM	25/M	239212302926017	09.12.2023	Self fall from bike	Head	Rt FTP SDH	E1V1M1	4	48	6	61	EXPIRED	1	1
100	JAGDISH PRASAD	54/M	239212302928729	09.12.2023	Fall from train	Head	Lt frontal, Rt temp contusions	E4V4M5	4	48	4	26	E4V4M6	6	7
101	DHARAM CHAND	58/M	239212302984637	16.12.2023	Fall from bike	Head	Bifrontal contusions	E1V2M4	5	71.4	6	61	EXPIRED	1	1
102	SHANI	35/M	239212302988560	16.12.2023	Fall from height	Head	Right frontotemporal SDH	E1V1M2	6	76	5	53	EXPIRED	1	1
103	SHANI	35/M	239212302988560	16.12.2023	Fall from height	Head	Rt FTP SDH	E1V1M2	3	39.5	5	53	EXPIRED	1	1
104	SHIVAM YADAV	26/M	239212303018955	19.12.2023	RTA van vs truck	Head	DAI,b/l occipital ,rt frontal contusions	E1V1M4	3	39.5	5	53	EXPIRED	1	1
105	OMKAR DHOTE	47/M	239212303040314	21.12.2023	Fall from bike	Head	Lt temp contusion with SDH	E3V4M5	2	25	3	16	E4V5M6	7	8
106	RAJU	23/M	239212303047823	22.12.2023	Fall from bike	Head	Lt temp, GC contusion	E2V1M5	5	71.4	4	26	E4V2M5	5	6
107	NIRAJ VERMA	45/M	239212303047203	22.12.2023	Fall from bike	Head	Lt temp contusion	E4V4M5	2	25	3	16	E4V5M6	7	8
108	ANIL KUSHWAHA	25/M	239212303061397	25.12.2023	RTA bike vs truck	Head	Rt FTP SDH, comminuted, depressed fracture	E1V1M3	5	71.4	5	53	EXPIRED	1	1
109	SOURAV	30/M	239212303075274	26.12.2023	RTA bike vs bike	Head	DAI with left partial and right frontal contusions	E1V1M2	2	25	3	16	EXPIRED	1	1
110	ASHUTOSH	25/M	239212303088384	27.12.2023	RTA bike vs bike	Head	Left acute SDH	E1V1M2	5	71.4	6	61	EXPIRED	1	1
111	AMIT TOMAR	23/M	239212400006392	01.01.2024	Fall from bike	Head	Rt BG , brainstem contusion	E2V2M4	2	25	3	16	E4VTM6	5	6
112	DAYA RAM	40/M	239212400023564	03.01.2024	Fall from bike	Head	Lt parietal contusion with DAI	E1V1M5	3	39.5	4	26	EXPIRED	1	1
113	UPENDRA	23/M	239212400023939	04.01.2024	RTA bike fall	Head	SAH left frontoparital, occipital SAH	E2V1M4	4	48.1	5	53	EXPIRED	1	1
114	HARISH YADAV	32/M	239212400040311	05.01.2024	RTA bike vs bike	Head	DAI	E1V1M1	5	71.4	6	61	EXPIRED	1	1
115	HAIMRAJ	35/M	239212400048371	07.01.2024	RTA bike vs bike	Head	Rt frontal EDH, Rt FTP SDH	E3V3M5	5	71.4	4	26	E4V5M6	7	8
116	MANISH	29/M	239212400062632	08.01.2024	ASSAULT	Head	Lt frontal contusion, Rt TP SDH	E1V1M5	3	39.5	4	26	E4V5M6	6	7
117	PRATHAM LODHI	21/M	239212400069891	09.01.2024	RTA bike fall	Head	B/L contusions with depressed fracture	E1V1M5	5	71.4	2	7	E4V4M6	7	8
118	PRITAM	45/M	239212400062209	08.01.2024	Fall from bike	Head	Rt frontal contusion	E3V3M5	5	71.4	4	26	E4V5M6	8	8
119	SHYAM YADAV	45/M	239212400080550	10.01.2024	Hit by bike	Head	DAI	E2V4M5	6	76	3	16	E4V4M5	7	8
120	PREM RANI	52/F	239212400081475	11.01.2024	RTA bike vs truck	Head	Rt FTP SDH,Rt FT contusions	E1V1M5	5	71.4	5	53	EXPIRED	1	1
121	UDAYABHAN	25/M	239212400096642	12.01.2024	RTA bike fall	Head	Right front temporo parietal SDH	E3V4M5	3	39.5	3	16	E4V5M6	7	8
122	MUNNALAL	50/M	239212400107245	14.01.2024	Hit by bike	Head	Lt TP contusion, diffuse SAH,DAI	E1V1M2	2	25	3	16	EXPIRED	1	1
123	SHANTI AHIRWAR	30/F	239212400118409	15.01.2024	RTA bike vs car	Head	Lt FTP EDH	E1V1M2	5	71.4	3	16	E4VTM5	3	4
124	RAMKANYA BAI	40/F	239212400128005	16.01.2024	RTA bike vs bike	Head	Lt BG contusion	E2V2M5	2	25	3	16	E3V3M5	5	6
125	BARDA LAL	55/M	239212400130093	17.01.2024	RTA bike vs bike	Head	Bifrontal contusions	E1V1M2	5	71.4	6	61	EXPIRED	1	1
126	SHIVAM TIWARI	24/M	239212400154553	19.01.2024	RTA bike vs car	Head	Rt FT depressed fracture with DAI	E1V1M2	5	71.4	5	53	E2VTM3	1	1
127	SHRIRAM AHIRWAR	29/M	239212400168392	21.01.2024	RTA bike vs bike	Head	Rt TP contusion	E4V4M5	4	48.1	4	26	E4V5M6	7	8
128	SHAJDA BEGUM	47/F	239212400169615	22.01.2024	RTA bike vs car	Head	Lt temp contusion	E1V2M4	5	71.4	4	26	EXPIRED	1	1
129	PRIYANKA	25/F	239212400271631	22.01.2024	RTA bike fall	Head	Bifrontal contusions	E3V4M5	5	71.4	3	16	E4V5M6	8	8